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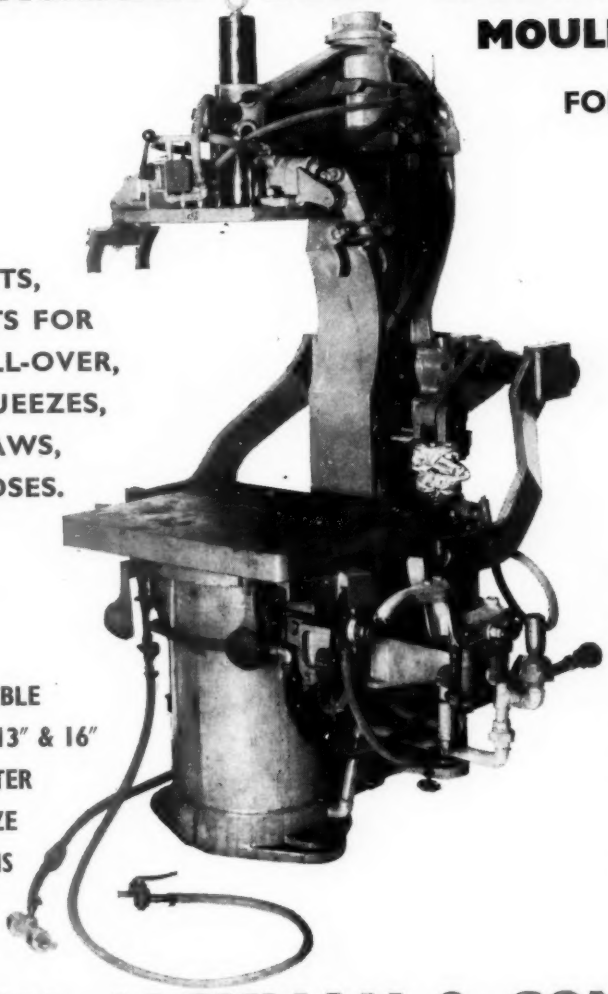

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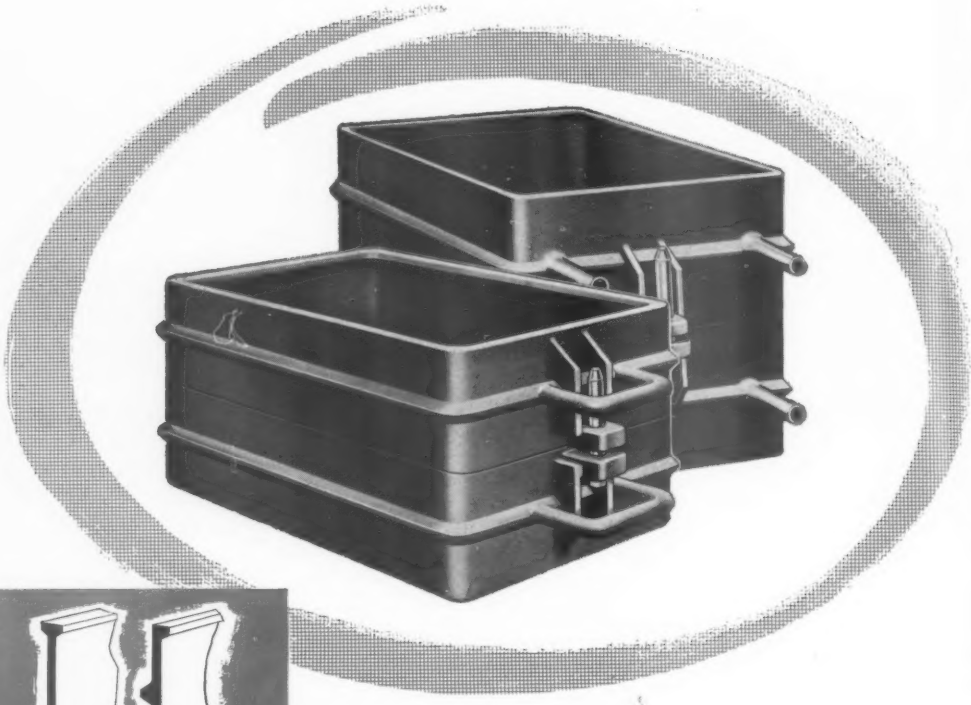

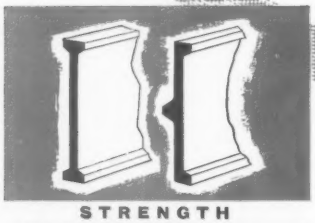

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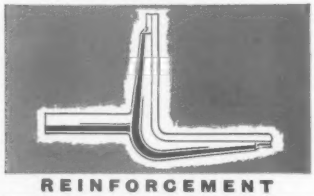

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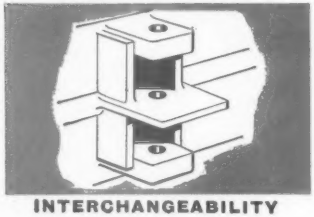

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In diesem Auszug aus einem Vortrag, welcher im Jahre 1957 vor einer gemeinsamen Tagung der Vereinigung Amerikanischer Maschinen-ingenieure und der Gesellschaft Amerikanischer Schweisstechniker gehalten worden war, besprechen die Verfasser die Erzeugung komplizierter Gusskörper durch Zusammenschweissen einzeln gegossener Bestandteile und erwähnen besonders die Erzeugung unter Zuhilfenahme von Schweissen und das Reparaturschweissen von Grossgussteilen für Turbinen 597

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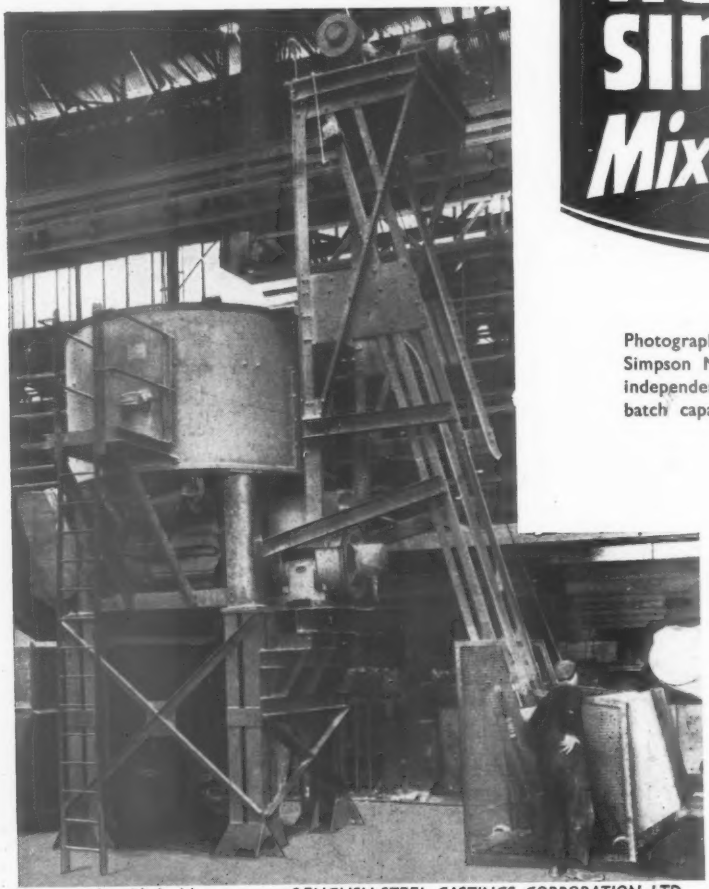
PERFECTION-in Sand Mixing

AUGUST-SIMPSON Mix-Mullers



Photograph shows a No. 3F size August-Simpson Mix-Muller, Bucket Loader and independently driven Aerator. Large batch capacity—approximately 4,000 lbs

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The Buxton Conference

MOST metallurgical and engineering conferences divide themselves into two parts—technical and social. The one held at Buxton last week reached the usual high standard in its technological aspects. We thoroughly appreciated Mr. A. E. Peace's presidential address in which he stressed the need for the provision of facts on mould making. Even such a simple assumption as "the weight of a casting made from the same pattern will be constant" cannot be relied on and variations of the order of 10 per cent. are not uncommon. This is but one factor amongst dozens of others which necessitates not merely control but absolute knowledge as to their origination.

Many of the papers and reports were of a high order, but the one which merited and received the highest praise for its presentation was the last one entitled "A Modern Foundry for the Manufacture of Small Steel Castings by New Moulding Techniques," by Mr. J. H. Osborn, Mr. R. F. Horton and Mr. T. A. Marsden. It was evident that a great deal of thought had been given to the way in which the discussion was to be handled and its success was noteworthy. If we understood Dr. Atterton correctly when he presented a report on the "Surface Finish of Non-ferrous Castings," he stated that the use of old sand had no deleterious effect in this direction. Yet whenever we have visited firms enjoying a high reputation for quality of surface on their castings we have invariably noted extravagance in the use of new sand. The foundry which we esteem makes non-ferrous castings of the finest finish and uses 100 per cent. new sand.

An outstanding feature of the conference was the number—nearly 20—and the variety of foundries which were open to inspection. Included were grey and malleable iron, steel and non-ferrous, and the visitors were impressed with production methods used and the high standard of the castings made. Where the conference did not give satisfaction was in the sphere of catering. The choice of menu for the banquet, its cooking and service, were alike deplorable and if Buxton is to attract serious large-scale conferences in the future there must be great improvement in the standard of catering and other services—even the chairs provided for the banquet were unsafe, and we personally saw no fewer than five "crashes."

Patternmakers to Visit Germany

A visit to patternshops in West Germany has been arranged by the National Society of Master Patternmakers to take place from June 11 to 17, for which the following arrangements have been made:—

The main party is to leave Liverpool Street Station on June 10, travelling by Hook of Holland and coach to Stuttgart, where they will arrive on the evening of the following day. On Thursday morning, a visit has been arranged to the works of Maschinenfabrik Esslingen, and in the afternoon to Paul Stetter, patternmakers and founders, Esslingen-Mettingen on the Neckar. On Friday, June 13, two firms are to be visited—Richard Rauscher during the morning and Halberger Maschinenbau und Giesserei (engineers and founders) in the afternoon. Both these firms are located at Ludwigshafen.

On Saturday, by coach, the party will proceed to Düsseldorf, and Sunday will be devoted to sightseeing. On Monday morning, the famous works of Friedrich Krupp is to be visited and in the afternoon, Eisenwork Hilden A.G. This is a large radiator foundry having its own patternshop. The return journey on Tuesday, June 17, is by coach to the Hook of Holland and boat to Harwich, getting the party back to London by 9.30 p.m. the same day. The cost of this trip is to the order of £32, but arrangements are being made for those who wish to travel by air, which will obviously cost more.

Industrial Training Centre

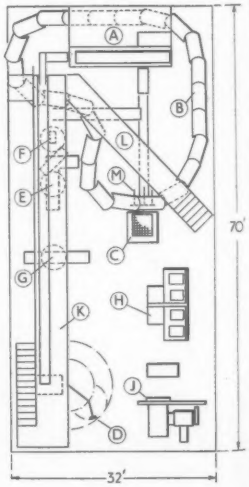
Commenting on 1957—the first full year's working of the Industrial Training Centre at Acocks Green, Birmingham—the chairman of the committee said at the "open day" recently that more than 300 different industrial undertakings from all parts of the world had sent students to the Centre and the total number attending the courses had been 1,400. The Birmingham and District Industrial Safety Group, he pointed out, were a completely voluntary body supported by modest subscriptions from Midland industries and by charging fees which only just covered the costs incurred.

The principal development during the year, he continued, had been the completion of work in the grounds outside used chiefly for training building workers. Stress was being laid on the use of visual aids. An epidiascope and a film strip projector had been acquired. Almost every course had a session during which films were shown relating to the risks in that particular course. In fact a pictorial record of the development of the Group had been made and would be shown to visitors. It dealt with the development of the Group with the alterations and modifications to the Centre, with its official opening and with its sister organisation—The Safety and Factory Efficiency Exhibition which was well established as a national shop window for showing safety products and devices to industry generally. This was held every second year and the next one would take place during June, 1959.

UK Firm at Cleveland Show

Foundry Equipment, Limited, recently staged a preview for UK foundrymen of the stand they have erected at the Cleveland Foundry Show this month (held in conjunction with the annual congress of the American Foundrymen's Society). The accompanying photograph shows the stand as set up in the firm's works at Leighton Buzzard and the sketch shows the location of the various items exhibited as follow.

(A) Con-Belt continuous sand mill (60 tons per hour); (B) continuous platform mould-conveyor; (C) "F.E.-Matic" shakeout; (D) "Junior" Sand-rammer, power-assisted with feed unit; (E) J.P.M. automatic moulding machine and mould-handling unit; (F) H.E. B.1 boxless moulding machine; (G) H.P.F.E.2 Hydroil-electric undersand-frame moulding machine; (H) "Auto 15" shell-moulding machine (24 by 18-in. shells); (J) No. 220/530 type D, automatic core-blower and rollover stripper; (K) sand-distribution belt platform including automatic ploughs; (L) visitors' walkway; and (M) pneumatic pusher. Note: the sand handling and distribution system incorporating three belt conveyors and two belt-and-bucket elevators.



Welding Low-alloy Steel Castings*

By N. A. Chapin, C. H. Soldan, and L. W. Songer

An important advance in the production of complex and high-quality castings is the use of welding to fabricate individually-cast parts into a single component. The method, by enabling the foundryman to concentrate on the details of a casting, makes for an improvement in the accuracy and quality of the product as a whole. Indeed this procedure is the only way in which certain of the more complex requirements of modern industry can be fulfilled. In the following abstract the authors discuss the use of welding with particular reference to castings in alloy-steel turbines.

Introduction

The paper describes the fabrication and repair welding of large alloy-steel castings for use in steam turbines operating at temperatures up to 566 deg. C. and at pressures up to 1.6 tons per sq. in. These castings vary in weight from 1,000 lb. to about 35-36 tons. The composition and heat-treatments for these materials are shown in Table 1. The successful use of casting-weldment components has been possible by the application of sound welding procedures and quality control.

TABLE 1.—*Composition and Heat-treatment of Materials.*

Material.	Nominal chemical composition per cent.					Heat-treatment.
	Cr.	Mo.	Mn.	C.	V.	
Cr Mo ..	1	1	0.70	0.20	—	Normalized, 1,049 deg. C min. Tempered 677 deg. C.
Cr Mo V ..	1	1	0.70	0.18	0.20	
Cr Mo .. (weld metal)	0.50	1	0.90	0.12	—	

Welded Castings

One of the greatest uses of welding lies in the casting field. In the past, foundries attempted to cast any design which was submitted to them. This meant that heavy sections, particularly in the bottom of the mould, contained shrink or other defects. High-quality complex castings are produced to-day by making the casting in more than one piece for subsequent fabrication. These separate castings can be placed in the mould for proper feeding and directional solidification which is a necessity for high quality.

Higher-quality components can be produced by using better-quality parts which have been made from the best suited material in the most economical manner and welded together. Since welding is a costly manufacturing operation, however, no component should be cast in more than one piece and welded if it is possible to cast a single piece of the required quality.

* Abstracted from a paper contributed by the Metals Engineering Division of the American Society of Mechanical Engineers for presentation at the ASME—AWS (American Welding Society) joint Metals Engineering Conference last year. The authors are connected with the large steam turbine-generator department of the General Electric Company, New York.

Weld Preparations

The guiding thought in the design of all types of weld preparations is to obtain fusion throughout the entire wall thickness, while at the same time keeping weld shrinkage and the attendant locked-up stresses and distortion to a minimum. To secure full penetration on a consistent basis, proper access to the root is a prime requisite which allows the welder to follow the welding progress and to maintain control of the arc. To minimize shrinkage, distortion, and fabrication costs, it is desirable to keep the amount of deposited weld metal to a minimum.

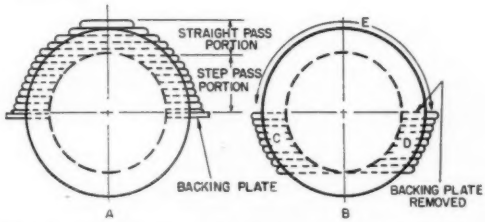


FIG. 1.—"*Step pass*" *submerged-arc welding of a circumferential weld.*

Metallurgical Aspects

Preheat

Welds which have a high degree of restraint and high residual stresses are encountered during fabrication and repair welding. In large section sizes, high multiaxial residual welding stresses can cause material failure with little deformation. For planned and repair welding, the components are preheated to 232 deg. C. minimum. This temperature is above the impact transition temperature of the base materials. Experience indicates that the maintenance of the preheat during welding is imperative and it is advantageous to continue the preheat until postweld heat-treatment can be effected.

Heat-Treatments

The main objectives of subcritical postweld heat-treatments are to relieve residual welding stresses and temper hard heat-affected zones. The Cr-Mo

Welding Low-alloy Steel Castings

and Cr-Mo-V steels considered in this paper are given a subcritical stress-relief cycle at 688 deg. C. In base materials whose heat-affected zones are subject to secondary hardening, the time at temperature is also an important variable. This time must be long enough to temper the heat-affected zone through its secondary hardening peak to a lower hardness approaching that of the base metal. The Cr-Mo-V steels considered in this paper are subject to this type of hardening, and are tempered satisfactorily by eight hr. at 688 deg. C.

Some large turbine castings are proceeded in the fully annealed condition during repair and planned welding. The annealed chromium-molybdenum castings have an average room-temperature yield strength in the range of 20 deg. C., while the normalized and tempered chromium-molybdenum castings have a room-temperature yield strength in the range of 31 tons per sq. in. This favours lower as-welded residual stresses for welds made in annealed base metal. It is difficult to maintain full preheat on some of the very large castings (*i.e.*, 35-36 ton large turbine shells), which require considerable handling time to reposition for further welding. Therefore the annealed material will be

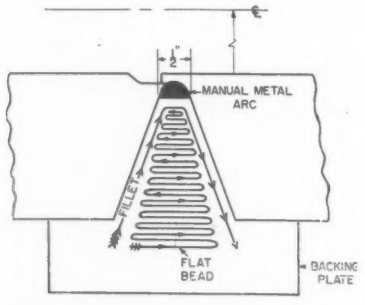


FIG. 2.—*Top view of a layer of "step-pass" welding showing direction of travel.*

less subject to repair-weld cracking when it is not possible to maintain a full preheat temperature until a postweld heat-treatment is performed.

The normalizing and temper heat-treatment after all planned and repair welding, assures complete relief of residual welding stresses. After a stress-relief cycle which is a subcritical anneal, the level of remaining stresses approach the yield strength of the materials at the stress-relieving temperatures. The heat-treatment which has been mentioned also completely eliminates the heat-affected zone and any "metallurgical notches" associated with it.

Distortion and scaling are normally experienced during this heat-treatment. By the use of tie bars, planned furnace loading and the allowance of extra shock for finish machining, these effects are overcome.

Stress Relief

The removal of casting defects by flame gouging can build up high residual stresses and hard heat-affected zones in one area. It has been found beneficial to use an intermediate subcritical stress relief during the repair welding of large areas in locations where high restraint is encountered.

Electrode Composition

The deposited chemical composition of weld metal used for the foregoing casting compositions is to be found in Table 1. Only low-hydrogen coated electrodes are used for metal-arc welding. Most of the welding, however, is done by the submerged-arc process.

Welding-process Techniques

The fabrication and repair of large castings were accomplished through the use of the following processes: Manual metal arc, manual inert-gas metal arc, mechanized submerged-arc, and manual submerged arc. Here the emphasis will be placed on the techniques which utilize a combination of manual metal-arc and manual submerged-arc welding. This will illustrate the manner in which these processes act to complement each other. All submerged-arc welding is done using $\frac{5}{32}$-in. dia. electrode with currents in the range 300-550 amp. and 30-55 arc volts.

It is important to note that a written procedure is prepared for each specific application. Test joints are welded using these procedures and are evaluated prior to release of the procedure for production use. All welders are qualified in the processes and procedures which they will use in production. A large portion of planned and repair welding is accomplished using manual submerged-arc welding. For this work welders have been trained and qualified in both manual metal-arc and manual submerged-arc welding. A qualification procedure for manual submerged-arc welding is used which includes radiographic evaluation. Assignment of these welders is controlled so that only one welder works on any weld from its beginning to its completion. This method makes one man responsible for the quality of the entire weld.

"Step-Pass" Technique

This technique consists of welding a series of short layers, beginning at the 3 and 9 o'clock positions and proceeding to the top. This is illustrated in Fig. 1 (*a*). This technique is being used extensively in the welding of connections (such as flanged elbows, and the like) to large castings where it is impracticable to rotate the workpiece for mechanized welding. This is applied to connections of wall thickness above $1\frac{1}{4}$ in. and i.d. of 6 in. and above.

Manual metal-arc welding is used to weld the bottom portion of the groove until a minimum root width of $\frac{1}{2}$ in. is obtained. Backing plates also are welded on in a location slightly below the centre of the weld, Fig. 1 (*a*). The manual submerged-arc welding of the step-pass portion consists of alternating passes of fillet welds and flat beads.

The weld is completely cleaned between each pass. Each layer consists of a fillet weld followed by a flat bead. The direction of travel for these beads is shown in Fig. 2.

It has been found helpful to limit the interpass temperature to 399 deg. C. to ease the complete removal of fused slag. Therefore, the welder frequently moves from one side of the connection to the other during the step-pass portion of the weld, thus allowing one side to cool while welding the other. When the straight-pass portion is reached the welding current is increased and the groove is completed in multipass layers. Bead thickness for both the step-pass and straight-pass portions is limited to ¼ in. to control the molten metal. Upon completion of one half of the weld, the work is turned over, backing plates are removed by gouging, the gouged portion is ground and magnetic-particle inspected, and the other half is then welded.

Repair Welding

Approximately 90 per cent. of repair welds are made by using the manual submerged-arc process. Manual metal-arc welding is used only on small areas and for contouring larger areas to make a satisfactory preparation for manual submerged-arc welding or postweld heat-treatment. Repair welding is usually accomplished by using bead sequences similar to those shown in Fig. 3. Note that beads start at the outside circumference of the cavity.

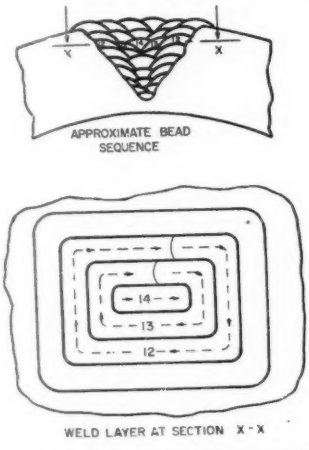


FIG. 3.—*Bead sequence for submerged-arc defect welding.*

Other Techniques

Studies of certain components have revealed that overall processing economies and advantages could result from the use of a mechanized welding technique in which circumferential welds are made by rotating the welding head rather than the workpiece. Therefore, procedures have been developed for mechanized submerged-arc welding a circumferential weld from one side with the axis of the workpieces in a fixed vertical position. The welding head revolves during this process. All welds made using this technique must pass X-ray evaluation. Fig. 4 illustrates this technique.

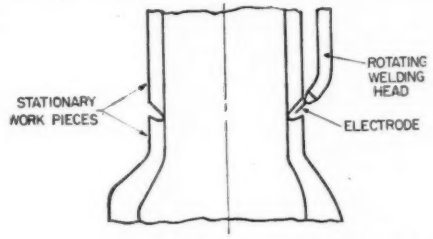


FIG. 4.—*Mechanized submerged-arc welding of a circumferential butt weld.*

Quality Control

The welding of heavy-walled, alloy-steel, pressure-containing parts requires a great degree of precaution and closely controlled welding practices. Therefore, a definite quality-control programme is imperative. Castings are cleaned and rough-machined before a non-destructive inspection is made. Turbine castings, planned and repair welds are subjected to the following inspections:—(*a*) Visual; (*b*) 100 per cent. magnetic inspection (ferritic materials); (*c*) 100 per cent. liquid penetrant (non-magnetic materials); (*d*) radiographic and (*e*) hydrostatic test of pressure components.

Disposition of Defects

The following evaluations are considered in determining the final disposition to repair or condemn each component:—(*a*) Location and size of defect. (*b*) Orientation with respect to other defects. (*c*) Proof that the defect has been completely removed. (*d*) Service experience. (*e*) Stress consideration (static and thermal). (*f*) Limitation of inspection methods. (*g*) Accessibility for welding. (*h*) Machining and heat-treatment status. (*i*) Strength of repair weld. (*j*) Economics.

Contour of Weld Preparations

The main factor controlling the final contour of the weld preparation for a defect is the removal of the minimum metal which will provide a satisfactory weld preparation. Three things that must be considered for a good weld preparation are:—(*a*) The position in which the defect is to be welded; (*b*) the process to be used; (*c*) freedom from undercut areas which may cause slag pockets during welding or difficulty in cleaning. The finished surface of all defect areas, whether repair welded or faded out, must blend into the adjacent surfaces to form a smooth contour.

Process welding on high-temperature components is of such importance that each weldment is processed as an individual part and complete records

of all inspections, welding procedures and postweld treatments are maintained.

Conclusions

Sound welds can be made in heavy-walled, low-alloy steel castings by the metal-arc welding processes if closely controlled procedures are followed. The process to be used must be selected to suit the size of the component and the position in which it is to be welded. Manual submerged-arc welding is especially suited to repair and planned welding and also will complement the other processes.

Heat-treatment, both pre- and postweld, plays an important role in final quality and serviceability of welds. Consideration of sound foundry practices and provision for accessible welds which can easily be non-destructive inspected are design requirements. Higher quality components can be made by using better quality individual parts, which have been made from the best suited material, in the most economical manner and welded together. The importance of quality control in welding of high-pressure, high-temperature cast-weldments is paramount.

Acknowledgments

The authors wish to express their gratitude to other members of the large steam turbine-generator department, General Electric Company, for their assistance in the preparation of this paper.

* Note to original paper: When this paper was written, the authors included information and expressed opinions believed to be correct and reliable. Because of the constant advance of technical knowledge, the widely differing conditions of possible specific application and the possibility of misapplication, any application of the contents of this paper must be at the sole discretion and responsibility of the user.

Pig-iron and Steel Production

Steel production in April averaged 407,800 tons a week, compared with 432,300 tons in March, a drop of 5.6 per cent. The average is also down on April, 1957 (430,000 tons). A similar drop is recorded in pig-iron production, which was at the rate of 256,900 tons, compared with 267,600 tons in March and 277,400 tons a year ago. The decline, states the Iron and Steel Board, reflects the corresponding decline in steel production and also the falling off in foundry iron production for building purposes.

Latest pig-iron and steel output figures (in tons), with the corresponding 1957 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1958—February ..	272,700	14,182,000	427,500	22,228,000
March ..	267,600	13,915,000	432,300	22,480,000
April	256,900	13,358,000	407,800	21,204,000
1957—February ..	267,600	13,916,000	432,100	22,470,000
March ..	277,200	14,415,000	431,000	22,411,000
April	277,400	14,425,000	430,000	22,360,000

Midland Industrialists discuss Free Trade

Midland industrialists assembled in force in Birmingham recently to hear Mr. Reginald Maudling, the Paymaster-General, address them on the European Free Trade Area scheme. Mr. Maudling, it will be recalled, is handling the affairs of the British Government in the negotiation of the scheme. He said that a smooth start to the proposed scheme may depend on the ability of the six Continental partners to reach agreement among themselves on common policy in the next two or three weeks. Failure to come to an agreement quickly could mean fresh dangers to the entire scheme. The six partners are France, West Germany, Italy, Belgium, Luxembourg and the Netherlands, which form the Common Market. Their task is to reach an agreement on the counter proposals put forward by France, now the chief stumbling block to the Free Trade Area plan.

Mr. Maudling, outlining the position of stalemate which is now prevailing, said that unless the six Continental partners could offer an agreed version of the counter proposals in two or three weeks, allowing the remaining 11 nations of the proposed free trade zone to settle major issues of principle by July, the entire scheme would run into two main dangers. The first was that if summer vacations began with nothing definite accomplished, leaving the scheme in the air, so to speak, there would be a substantial weakening in public support of the plan in Britain and a number of other countries. The second was that if the scheme did not come into operation next January, with synchronization with the Common Market on the start of tariff reductions, Europe would become out of step in trade, with harmful effects on what had been achieved by OEEC in the last 10 years.

Critical Phase

Speaking at a news conference which preceded the meeting, Mr. Maudling admitted that negotiations on the free trade plan had now reached a difficult stage. Meanwhile, opinion in Britain, at first sceptical and concerned about prospects, had changed to regard free trade as a good move. The alternative would be very unpleasant to the whole of Europe, he said. Experience had shown that modern industry depended on really big markets for maximum efficiency. If the free-trade proposals succeeded it was bound to mean an increase in the economic strength of all Western Europe, higher standards of living, and better chances to provide capital to help the development of backward countries throughout the world. On the other hand, failure would mean a divided Europe which might lead to the loss of definite gains made through OEEC.

The French had now combined the criticisms and reservations they had long voiced in free trade negotiations into a single document—the item which now had to be discussed by France with her five partners in the Common Market. There could be no further fruitful meetings of the full 17 nations of the free trade zone until a reply had been received. The British motor-car industry was one of the leading items causing the French concern, Mr. Maudling said. They were worried about facing the competition of Britain in all the metal-using industries in a free trade area.

Mr. Maudling predicted that if the free trade talks ended in failure, it would mean in the long run the elimination of the greater part of our trade with the six Common Market nations. Britain could not compete with duty-free German machinery if paying a 20 per cent. tariff.

Equipment & Supplies

Self-opacifying Titania Enamels for Cast Iron

Recent research carried out by Metal Porcelains Limited, Cornwall Road, Smethwick, Birmingham, on the subject of titania self-opacified covercoat enamels, aimed at raising the coefficient of expansion to around 300×10^{-7} cubical and increasing the fluidity, has resulted in the development of a range of enamels suitable for application to cast iron, either direct or on top of annealing-type grip coats. Production experience has shown them to be at least as workable as conventional enamels for cast iron and chipping or shaling has been found to be a hazard in the field tests. This development brings to cast iron enamelling practice the most up-to-date type of covercoat enamel frits.

Advantages obtained by users are reported to follow closely those conferred by the changeover from antimony-opacified to titania self-opacified enamels on sheet steel some years ago. Satisfactory coverage is obtained in one coat at about 0.010 in. thickness compared with 0.015 to 0.020-in. in other enamels. This increased covering power has particular advantage on certain cast-iron components, *e.g.*, cooker-front castings, where—due to the relatively complicated shape—it is difficult normally to cover radii and corners adequately without building up excessive thickness on adjacent areas; attempts to avoid excessive build up frequently result in poor coverage on radii. The thinner enamel application makes for greater durability and improved shock resistance, while on re-coated work total enamel thickness need not now be excessive; thus reducing the hazards associated with over-thick enamels. Control of thickness of application should be relatively simple, since the enamel is prepared almost exactly like titania sheet-iron enamels and is applied using spraying equipment of the same type as for sheet Material savings of about 30 per cent., it is claimed, can be achieved with the new enamels.

The report goes on to state that with the new enamels the quality of finish is improved, particularly in terms of opacity and brightness, and a good-quality white is now possible without the use of special undercoats. Pastel colours can also be produced in self-coloured enamels with the same benefits as have been obtained in recent times on sheet steel. The improved qualities of finish, it is said, permit exact matching of sheet to cast-iron components—a very important matter where the two materials are adjacent on appliances and a feature difficult to realize sometimes where dissimilar enamels are used.

Water-treatment Control

Now that so many foundries are using cooling water for one purpose or another, interest is created for them by a new and simple testing kit which has been marketed by Albright and Wilson (Mfg.), Limited, of 1, Knightsbridge Green, London. This enables control tests to be made easily and quickly on different types of water. The results obtained using this kit are adequate for the great majority of water-treatment control purposes, although slightly less accurate than those obtainable under closely controlled laboratory conditions.

Air-operated Pump

To meet the demand for a source of hydraulic power to operate presses and similar equipment, Charles S. Madan and Company, Limited, of Altrincham, Cheshire, have designed a new range of compressed air-operated pumps. An important feature of this type of pump—known as the Airhydro Power Unit—is its ability to maintain a static pressure indefinitely without consuming any air. If the balance is disturbed through a leak or a movement in the power-loaded machine, the pump will, it is claimed, automatically move sufficiently to maintain the hydraulic pressure required.

Applications into which this unit has already been built include presses, jacks, crimping machines, filter presses, emulsifiers, nozzle testers, stacking machines, drill rigs, embossing rollers, calender rolls, heavy trailers, lathes, and many others.

Electric Furnace Elements

Morgan Crucible Company, Limited, Church Road, Battersea, have announced a new non-metallic element, which, it is claimed, makes electrical heating of furnaces both economic and convenient. The advantage of this form of heating—simplicity of furnace design, cleanliness and absence of flue gases—can be utilized in temperature ranges up to 1,500 deg. C. The element, known as "Crusilite," is a one-piece, silicon carbide tube, produced by a new method which uses a spiral as the hot zone. There are no joints between hot and cold zones, and therefore, a common source of failure in other elements of this type does not exist. Among its foundry applications are:— Determination of carbon and sulphur in iron and steel; experimental heat-treatment and firing of all types of materials; and general research in refractory materials.

WOLF ELECTRICS TOOLS, LIMITED, Pioneer Works, Hanger Lane, London, W.5, have recently placed on the market a new radial drill arm which adapts their bench drill stand for further applications.

AMBER OILS, LIMITED, of Albemarle Street, London, W.1, have introduced a new tapping fluid known as A.P. Cutting Fluid. It is an extreme pressure coolant with unusual penetration properties. It was originally produced for tapping armour plating, but has since been found to be useful for tapping all very high-tensile materials, including Nimonics. The firm are manufacturers of specialized industrial oils, including a silicone-spray mould-lubricant.

Cammell Laird Revises Shipyard Plans

Plans connected with the £17,000,000 eight-year shipyard reconstruction scheme of Cammell Laird & Company, Limited, have been revised owing to the changed economic condition of the country, states Mr. J. C. Mather, chairman, in his statement with the 1957 accounts. To reduce the financial burden on the company it has been decided to spread the scheme over a longer period and to implement it in three stages. Work on the first stage has now started. It is estimated that this phase will cost over £8,000,000 and should be completed by 1960.

The past year was a busy one for the group and good progress was made in all sections, says Mr. Mather. The shipping boom at the start of the year had looked well set, but the end of the year saw the end of the boom with freight rates tumbling and ships being laid up in increasing numbers.

Of group commitments of £6,115,128 (£4,230,670), there is £1,250,000 in respect of the parent company, representing subscription for a further 1,000,000 "B" ordinary £1 shares in the English Steel Corporation, Limited, at 25s. each. The balance of £4,865,128 consists of orders placed under reconstruction and development schemes of subsidiaries. Group net profits rose from £877,070 to £1,102,172 and the dividend is raised 1 per cent. to 15 per cent.

Dinner

INSTITUTE OF BRITISH FOUNDRYMEN

The annual banquet of the Institute of British Foundrymen during the 55th annual conference was held at the Pavilion, Buxton, on Wednesday, May 14. Among those seated on the top table were Mr. A. H. Hockley (International Combustion, Limited); Mr. T. Graham Jackson (Jackson Bros. (Milton), Limited); Mr. G. H. Charsley (Trent Foundries, Limited); Mr. Z. Z. J. Kosarski (Sheepbridge Alloy Castings, Limited); Mr. A. F. Kelley (Rolls-Royce, Limited); Mr. K. Marshall (Joint Iron Council); Mr. G. E. Lunt (president, Foundry Trades' Equipment & Supplies Association); Mr. Arnold Carr (president, Refractories Association of Great Britain); Professor A. J. Murphy, M.SC., F.I.M. (Edward Williams Lecturer); Mr. J. W. Gardom (past-president and chairman of Conference Committee); Mr. G. M. Menzies (chairman, British Steel Founders' Association); Mr. J. Blakiston (immediate past-president); His Worship the Mayor of Buxton (Councillor J. Bootherstone, J.P.); Mr. A. E. Peace (president); Lord Hives, C.H., M.B.E., D.SC.; Mr. C. H. Wilson (senior vice-president); Mr. C. R. Wheeler, C.B.E., (president, Iron & Steel Institute, and president, Institute of Vitreous Enamellers); Mr. E. Player, C.B.E. (president British Cast Iron Research Association); Mr. S. H. Russell (S. Russell & Sons, Limited); Wing Commander J. M. Aiton (Aiton & Company, Limited); Mr. G. H. Parkinson (Ley's Malleable Castings Company, Limited); Mr. P. B. Higgins (president, Association of Bronze & Brass Founders); Mr. M. Jeancolas (*L'Association Technique de Fonderie*); Mr. G. R. Shotton (junior vice-president); Mr. H. R. Newman (Butterley Company, Limited); Mr. R. A. Duff (Parker Foundry (1929), Limited); Dr. A. H. Sully, M.SC. (director, British Steel Castings Research Association); Mr. T. F. B. Simpson (British Transport Commission), most of whom were accompanied by their ladies.

After the Loyal Toasts, proposed by the president, Mr. J. Blakiston proposed the toast of the "Corporation of Buxton," and His Worship the Mayor of Buxton responded. Lord Hives proposed the toast of "The Institute of British Foundrymen," to which the president, Mr. A. E. Peace, replied. "The Guests" was proposed by Mr. C. H. Wilson, and Mr. C. R. Wheeler responded. Music during dinner was supplied by the Palace Hotel Orchestra, under the leadership of Mr. Ken Dean.

Latest Foundry Statistics

Steel Castings. According to the monthly statistics issued by the Iron and Steel Board the number of people employed on March 8 in the steelfoundry industry was 20,560, 100 fewer than a year ago and 80 fewer than a month earlier. Provisionally the average weekly output of steel castings during March was 6,400 tons, *i.e.*, 200 lower than February but 300 tons higher than March 1957.

Copper-base Castings: The British Bureau of Non-Ferrous Metal Statistics, in their *Bulletin*, report that the output of copper-base castings during March was 6,256 tons. The total for the first quarter at 19,230 tons is lower by 806 tons than that of 1957.

SEVEN EMPLOYEES who had completed 25 years' service with George Fletcher & Company, Limited, engineers, Derby, were recently presented with gold watches by Mr. C. W. Murray, chairman and managing director.

Shortage of Trained Teachers

At the annual presentation ceremony of the Birmingham College of Advanced Technology, held in Birmingham Town Hall last month, honorary associateships were conferred on Sir Anthony Bowlby, managing director of Guest Keen and Nettlefolds (Midlands) Limited; Sir Harold Roxbee Cox a director of Wilmot Breeden (Holdings), Limited, and Sir Herbert Manzoni, Birmingham City Engineer. The scrolls were presented by Mr. J. J. Gracie, managing director of the General Electric Company, Limited, Witton, and chairman of the College governors. Dr. P. F. R. Venables, principal of the College, announced that in the audience were four professors from the Mendeleev Technological Institute, Moscow, and the director of the Leningrad Technological Institute. Dr. Venables had met them when in Russia last autumn.

Replying on behalf of the new associates, Sir Harold Roxbee Cox said that Britain was doing as well as any western country, including the United States, in scientific and technical education. "Russia is educating twice as many" he went on "and when we remember her population we realize the magnitude of the task ahead of us. Russia has set us a great target." Dr. Venables said that expansion of specialist courses at the College was being restricted by a shortage of trained and experienced teachers. He said the position was causing "acute and growing anxiety." One of the ironies of the situation was that so few in industry were aware of the great changes which had come about in teaching in the last few years. He did not think that staff recruitment, the critical problem affecting technical colleges generally, would be solved "without further appropriate action at national level." Diplomas of associateship were presented to 113 students. The Engineering and Allied Employers Association prize went to Mr. Victor Neale.

New Company Formed for Nuclear Station Project

A new company—the English Electric, Babcock & Wilcox & Taylor Woodrow Atomic Power Construction Company, Limited—has been formed to administer the contract for the nuclear-power station at Hinkley Point in Somerset, construction of which began last autumn. The contract will be carried out by the three companies of the group under sub-contracts with the new company.

The directors of the new company will be Mr. H. G. Nelson (English Electric), Mr. McNeil (Babcock & Wilcox), and Mr. F. Taylor (Taylor Woodrow Construction). When the project is completed, it will be the largest nuclear power station in the world, with a net electrical output of 500,000 kw.

Tonnage Oxygen Plant for North-Western Gas Board

Reported to be the first gas board in this country to use a tonnage oxygen plant, the North Western Gas Board is to instal the new plant at its hydrogenation plant at Partington, near Manchester. It will be capable of producing nearly 63 tons of oxygen a day. The oxygen will enable oil to be partially oxidized to produce hydrogen, which in its turn will enable further quantities of oil to be hydrogenated to produce town's gas. The contract for the tonnage oxygen plant was placed with Air Products (Great Britain), Limited, by Humphreys & Glasgow, Limited, the main contractor.

Effect of Composition on the Properties of Ductile Iron*

By R. D. Schelleng and J. T. Eash

The potentialities of ductile iron at high temperatures can be influenced and increased to a considerable degree by alloy additions. The following paper discusses variations in the phosphorus, copper and molybdenum contents of ferritic and pearlitic ductile iron and presents data on the effects of heat-treatment and composition on creep resistance. Material is also submitted on the tensile-strength, stress-rupture and creep properties of nickel-copper and nickel-austenitic ductile irons.

Ductile iron, because of its combination of good castability, strength, and resistance to growth, holds considerable promise for use at elevated temperatures. Unlike the strength of grey iron, which is conditioned largely by the graphite-flake size and distribution, the properties of ductile iron are controlled mainly by the properties of the matrix. Thus, the strength of ductile iron can be influenced considerably by alloy additions.

This paper discusses the effects of variations in phosphorus, copper, and in molybdenum contents and in heat-treatment on the creep resistance of ferritic and pearlitic ductile iron at 427 deg. C. Additional data on the tensile strength, stress-rupture, and creep properties of a nickel-copper ductile iron at temperatures up to 538 deg. C. and of 20-35 per cent. nickel austenitic ductile iron at temperatures up to 649-760 deg. C. will also be presented.

Normally the amount of phosphorus in ductile iron is minimized because it decreases the toughness of the material. However when present in quantities of 0.05 per cent. to 0.09 per cent. impairment of the ductility is not excessive and the tensile strength of the iron is considerably higher than shown by irons essentially free of phosphorus. The work under review has shown that by maintaining the phosphorus content of ductile iron at around 0.09 per cent. a significant improvement in creep resistance is secured.

Molybdenum was found to be very effective for increasing the creep resistance of spheroidal-graphite iron. Two irons containing 0.24 per cent. and 0.81 per cent. molybdenum were tested. At 427 deg. C., the 0.8 per cent. molybdenum iron in the annealed condition showed a minimum creep rate of 1×10^{-4} per cent. per hr. at 18.1 tons per sq. in.: however, third stage creep started after about 1,600 hours, with a stress of 15.9 tons per sq. in., which indicated the safe working load to be somewhat less where stable long time service would be required. At 538 deg. C., a minimum creep rate of 1×10^{-4} per cent. per hr. was produced at a stress of 3.57 tons per sq. in.

The iron containing 0.24 per cent. molybdenum was less resistant to creep than the iron having 0.8 per cent. molybdenum. However, its creep strength was twice that of the low-alloy samples. The amount of molybdenum which can be added to ductile iron is limited, because this alloying element is a carbide-former and excessive amounts of it will embrittle the material.

Copper has been added frequently to ductile iron, mainly as part of the addition agent for magnesium. It tends to stabilize the pearlite and thereby lowers the ductility and toughness. It also raises the impact transition temperature; consequently its use has been reduced in recent years. Copper does have a beneficial effect on creep resistance, however, and when used in combination with nickel, some of its detrimental effects are overcome.

Creep data obtained on ductile irons containing about 1.1 per cent. nickel, 0.6 per cent. copper and 0.085 per cent. phosphorus were obtained. In the annealed condition, the material showed a minimum creep rate of 1×10^{-4} per cent. per hr. at 427 deg. C. when stressed at 9.2 tons per sq. in., which is

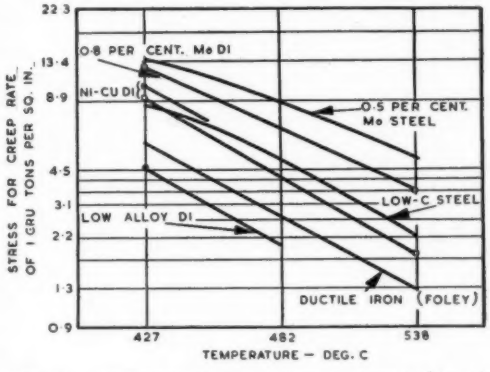


FIG. 1.—*Summary of creep data on ferritic ductile iron.*

a marked improvement over low-alloy irons and approaches the strength of the iron containing 0.8 per cent. molybdenum.

An as-cast, stress-relieved specimen of this copper-bearing iron exhibited creep properties at 427 deg. C. slightly superior to those shown by the material given the annealing treatment. Also, the stress-relieved specimen was superior to the annealed in that it had not entered third stage creep after 5,650 hours of testing. The creep rate of the annealed material started to increase slowly from its minimum value after 3,500 hrs.

* Presented at the American Society for Testing Materials' annual meeting in June, 1957, and later published in the society's *Proceedings* (v. 57, 1957).

Composition of Ductile Iron

The creep properties of this nickel-copper ductile iron at 316 deg. C. and 538 deg. C. were also explored. Two bars of the material were tested with 13.4 and 17.9 tons per sq. in. stress at 316 deg. C. A small amount of first stage creep occurred, but after about 1,800 hours the creep rates were essentially zero. At this temperature yield strengths become more significant than creep. At 538 deg. C. the stress for a 1×10^{-4} per cent. per hr. creep rate in the annealed nickel-copper iron was found to be 1.8 tons per sq. in.

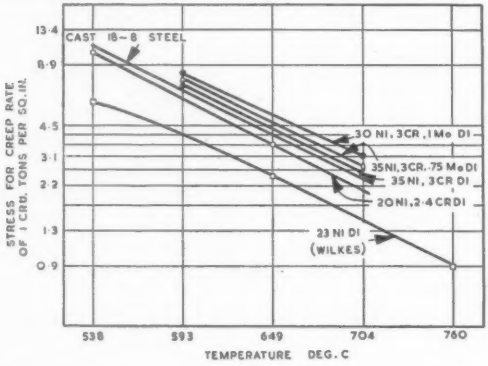


FIG. 2.—*Summary of creep data on austenitic ductile iron.*

Stress rupture tests were also performed on the annealed nickel-copper ductile iron. The data obtained indicate that the stress to produce rupture in 1,000 hours for this material should be about 12.1 tons per sq. in. at 427 deg. C. and 3.4 tons per sq. in. at 538 deg. C. The short-time elevated-temperature tensile properties of the annealed nickel-copper iron were also determined. An ultimate strength of some 31.3 tons per sq. in. was maintained up to 316 deg. C., followed by a decrease to about 15.7 tons per sq. in. at 538 deg. C. The yield strength diminished more gradually from 24.6 at room temperature to 14.3 tons per sq. in. at 538 deg. C.

A summary of the more important creep results on ferritic irons compared with published information on steels is presented in Fig. 1. The superiority of the copper- and molybdenum-containing irons over the low-alloyed iron is evident. The strength of copper-bearing material approximates to that of low-carbon steel and the properties of the iron containing 0.8 per cent. molybdenum approach those of 0.5 per cent. molybdenum steel.

Creep data have also been obtained on a group of austenitic ductile irons containing 20-35 per cent. nickel, 1.70.3 per cent. chromium and 0-1 per cent. molybdenum over the temperature range of 538-704 deg. C. The creep properties of this group of alloys are similar to those of cast 18.8 stainless steel as is shown by Fig. 2. The irons containing 30 and 35 per cent. nickel are somewhat more creep-resistant than cast 18.8 stainless steel, while the iron containing 20 per cent. nickel is not quite as strong. The stress to cause rupture of nickel-austenitic ductile iron after 1,000 hours at 593 deg. C was found to vary from 8.3 tons per sq. in in an iron containing 20 per cent. nickel and 2.4 per cent. chromium to 11.0 tons per sq. in. for an iron containing 30 per cent. nickel and 3 per cent. chromium. Addition of 0.7.1 per cent. molybdenum to these irons increased their respective 1,000-hr. rupture strengths by about 2.0 tons per sq. in. An increase in the nickel content of the iron from 30 per cent. to 35 per cent. further increased the strength by 0.7-0.9 tons per sq. in.

An increase in the silicon content of a 30 per cent. nickel ductile iron from the usual 2 per cent. level to 5.5 per cent., with a simultaneous increase in chromium to 4.5 per cent., was detrimental to the rupture strength although such a change would greatly improve the corrosion resistance. The 1,000-hr. rupture stress at 593 deg. C. for this type of iron was 7.6 tons per sq. in. The addition of 0.9 per cent. molybdenum was not as effective in this alloy as in the others, for the rupture strength was increased by only 0.4 tons per sq. in.

At 704 deg. C. the 1,000-hr. rupture stresses for the above group of austenitic irons varied from 2.9 tons per sq. in. for the 4.5 per cent. chromium, 5.5 per cent. silicon, 30 per cent. nickel iron to 5.6 tons per sq. in. for the 35 per cent. nickel type containing molybdenum. The relative performances of the various alloys remained approximately the same. A summary of these rupture data is shown in Fig. 3. The short-time ultimate strength of the 20 per cent. nickel, 2.4 per cent. chromium

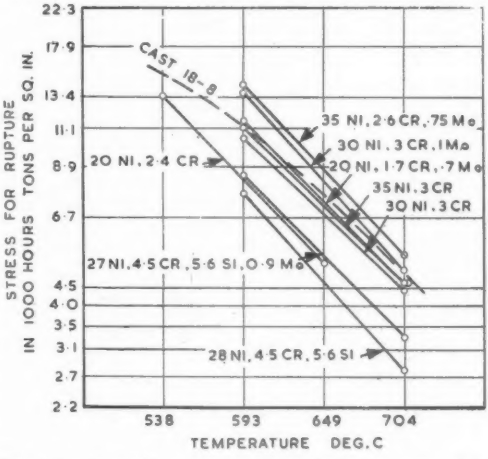


FIG. 3.—*Summary of rupture data on austenitic ductile iron.*

melt was found to decrease gradually from some 26.8 tons per sq. in. to 21.5 tons per sq. in between room temperature and 427 deg. C. and to 8.9 tons per sq. in. at 760 deg. C. The elongation varied from 10 to 15 per cent. over the same range.

Association Technique de Fonderie . . . Thirty-first Congress at Marseilles

A Report by the Editor

This is the first time that a foundry congress has been held in Marseilles, yet it must surely be one of the oldest metallurgical centres in the world, for in Roman times it was a major port for the import of tin and other metals. The congress (held from April 27 to 30) was under the presidency of Mr. Jean Lainé, who is the head of the Foundry Technical College in Paris. About 150 members participated, including visitors from Belgium, Italy and England. The meetings were held in the lecture theatre of the Chamber of Commerce—a very important body which amongst other activities performs locally those duties undertaken by the Port of London Authority.

Address of Welcome

An address of welcome was given by Mr. J. Arman, the president of the district foundry employers' association. In the course of his remarks, Mr. Arman said the Marseilles foundry industry undertakes the provision of castings for marine engineering and ship repair work, including propellers weighing up to 40 tons, railway, mining and civil engineering and general jobbing work. It employs about 1,000 people, that is about $\frac{1}{10}$ of those employed in the engineering industries of the district. Each year, the foundries manufacture about 8,000 tons of cast iron, 6,000 tons of steel, 2,000 tons of copper-base alloys and 500 tons of light alloys as castings. Local production is better known for quality rather than quantity. It enjoys the use of a district laboratory as part of the organization of the *Centre Technique des Industries de la Fonderie*, which assists in the control of both quality and costing methods. This is a unique service not available to most other industries. To-day, the trend is towards mechanized quantity production; could plastics be a competitor for this type of casting as seemed possible? At the other end of the scale, there is the competition from weldings for the largest castings. As to the Common Market, the French foundry industry has for some years studied this important problem. The initiative has been taken by Mr. M. Olivier, the president of the French foundry employers' association, who has founded an international committee where the effects of the Common Market are being carefully studied. Before, however, the publication of these findings, Mr. Arman said he was certain that the French foundry industry was well placed to withstand successfully international competition, provided they were not previously crushed through financial troubles. He then formally declared the conference open.

Before the conclusion of the day's business, a pleasing ceremony took place, when Mr. Mario Olivo, an honorary member, presented the Association with a very beautifully-bound album consisting of two sections. The first part was a book in English published by subscription dealing with the life and work of Ghiberti, the creator of the famous gold doors of the Baptistry at Florence. The second portion dealt, using typescript and photographs, with the work undertaken by Mr. Somalgio and others for their restoration, using a new technique. The photographs showing "before" and "after" reveal wonderful details such as have not been seen for many decades. Mr. Olivo was warmly thanked by Mr. Lainé for his generous and most interesting gift.

The whole of the day was taken up with the presentation of nine technical papers, stress being placed on marine engineering foundry practice. At the conclusion of the sessions, Mr. Lainé brilliantly summed up all the information disclosed. In the evening, there was the annual banquet held in a restaurant perched high above the Marine Drive.

Fonderies Méridionales

The second day, Tuesday, April 29, was devoted to works visits. The first one was to the Fonderies Méridionales, a concern employing about 130 workpeople, making iron, steel and non-ferrous castings and specializing in the production of marine propellers and centrifugally-cast tubes. There is ample melting capacity—three tar-oil-fired reverberatory furnaces of 20, 15 and 7½ tons capacity—for the production of the largest sizes of high-tensile brass propellers. The melting loss is of the order of 4 per cent., using a casting temperature of 1,200 deg. C. Much use is made of cement sand for moulding.

The iron and steel foundry operates a stationary type of French made sand slinger. The melting plant is very elastic and consists of four solid-bottom cupolas with capacities descending from 10 tons to 12 cwt. per hour. They provide, *inter alia*, metal for a 4 to 5 tons bottom-blown converter. As the winter only lasts a month, it is unnecessary to heat the foundry and if a cold snap is experienced, then resort is had to braziers. There is no patternshop attached to this foundry and all patterns are supplied by master patternmakers. The labourers are practically all coloured folk. There appeared to be an absence of apprentices.

Fonderies des Anciens Etablissements Groignard

This is the oldest foundry concern in the region. It was founded in 1805 by Mr. Asquier and later, acquired by Mr. Groignard. For many years, it served the olive-oil industry of the district, but after the invention of ground-nut oil, this service expanded to meet the needs of the soap-making industry for which Marseilles is noted. This industry needed iron castings for pumps, oil presses and valves and for many years, the foundry possessed

Association Technique de Fonderie

a veritable museum of several hundreds of all types of valves and taps of every size. The foundry which also cast non-ferrous alloys, was housed in an old stage-coach stable, in the Avenue d'Arenc and remained there for a century. Simultaneously with the development of the oil refineries and soap works, came little by little, the steamship replacing sail. The old foundry then made steam engines, boiler-house castings and firebars.

In 1918, the Groignard concern as a limited liability company took over from Mr. Groignard and found the shops in the same position using the same techniques, plant and out-of-date machines, such as wooden, hand-operated cranes and cupolas in the open air charged from the top.

In 1945, however, after having exhausted every means of improvement of the old plant, it became inadequate to meet the demands and the new foundry as it exists to-day was constructed. By using natural levels, it has been possible to have the scrapyard on the same level at the cupola charging door. Thus, a system of fork-lift trucks serves just as satisfactorily as overhead cranes and magnet lifts. Near the scrapyard a full-sized swimming bath has been installed for the use of the men—an amenity much appreciated during the long, hot summer months.

The main moulding shop—300-ft. long by 60-ft wide—is served by two overhead travelling cranes of 20- and 5-ton capacity. A second one housing moulding machine plant is 250-ft. long by 45-ft. wide and spanned by a 12-ton crane. At the scrapyard level, the coreshops and stoves are housed. Whilst no claim is made to have created a perfect foundry, it is interesting to note that with the same staff the annual production has risen from 500 tons of ordinary grey iron to about 2,000 tons of which two thirds are special high-duty irons made for a variety of uses, such as heat engines and castings for the Admiralty.

The history of the works was given, through a loudspeaker by a lady secretary sitting in her office, to the visitors on arrival in the forecourt of the works. This is an innovation worth emulating by firms receiving groups of guests to visit their shops. In this forecourt were stacked, presumably for sale, half a dozen examples of 17th century firebacks.

Visit to Aix en Provence

We were so impressed by the works of the *Arts et Métier* engineering school in this old city—the ancient capital of Provence, that the week before last we dealt with it editorially. Beyond stating that we found the students to be very intelligent, with a really practical outlook on their future, we will confine ourselves to repeating that this school was in truth a medium-sized, well-equipped, engineering works. It is a Government-sponsored organization and has no Governing Body. It is under the surveillance of the district inspector for technical education, who reports direct to the Ministry in Paris. After the visit, the guests were entertained by the Mayor and Corporation to a *Vin d'Honneur*, or in plain English, a cocktail party.

Social Events

All the members and their ladies were invited to participate in all-day excursions to the country on the Sunday prior to the opening of the congress and on Wednesday, the last day. In addition, there were daily sightseeing trips for the ladies.

The writer, in common with all the members, came away with feelings of gratitude to the founders of Marseilles, the president, Mr. Lainé, and the permanent officials of the Association, for a thoroughly instructive, well-planned and enjoyable congress.

Appleby-Frodingham Furnace Shut Down

Shortages of ingot orders from the Rotherham works of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, have caused the shut-down of the latest and largest steel furnace at the Scunthorpe works of the Appleby-Frodingham Steel Company (branch of the United Steel Companies). The 250-ton open-hearth furnace was built specially to meet orders for ingots averaging about 2,000 tons a week from the Rotherham branch, and it has been in operation for 17 months.

A spokesman for Appleby-Frodingham said that it was the first time since the war that a furnace had been shut down because of lack of work, but this was the only furnace the firm had built specially to supply one of its associates. When orders picked up, the furnace would resume production.

For Steel, Peech & Tozer it was stated that the drop in orders was due to production falling. This had already resulted in 250 men being laid off, but it was likely to be only temporary.

Together with the announcement of the shut-down came the news that Appleby-Frodingham's "O" furnace, also in the melting shop, broke records with its April output of 3,605 tons, an increase of 429 tons over the figure for the previous April.

Babcock & Wilcox's Record Turnover

During 1957 Babcock & Wilcox, Limited, boiler-makers, etc., of London, E.C.4, achieved a record turnover, states the chairman, Mr. W. Lionel Fraser, but profit margins were reduced and the company had only a slightly higher total profit last year than in 1956. The order-book remains full, but keen competition has rendered many prices unattractive, and Mr. Fraser foresees no sign of this tendency being reversed. Many new projects that the company has in hand of a long-term nature will, however, "undoubtedly work out advantageously."

World conditions, incessantly rising costs of labour and materials, restrictions, and "burdensome taxation" posed many problems, but directors are fully alive to these problems, says Mr. Fraser, and they are striving towards greater efficiency.

Group net profits rose from £1,547,216 to £1,775,861 for the year, and the final dividend of 6½ per cent. is on a capital increased by a one for four rights issue at par, and follows a 7 per cent. interim on the smaller capital. Capital expenditure sanctioned and outstanding at balance-sheet date was £2,910,000.

ALLEY & MACLELLAN (POLMADIE), LIMITED—Mr. H. R. Neilson has been elected chairman in place of Dr. A. S. MacLellan, who remains a director.

Notes from the Branches

East Anglian Section

The East Anglian section of the Institute of British Foundrymen held its last meeting of the 1957/58 session on April 15, when the annual general meeting preceded a general discussion on foundry topics and problems. During the business of the meeting the secretary reported that the meetings of the session had been supported as strongly as in previous years, with the exception of the January meeting when, due to bad weather, there was a record low attendance of 20; otherwise the average attendance was 45. The most popular meeting had been the one at which Mr. Parkes gave his paper on moulding sands. At the beginning of the session the Council had agreed that, to save money on postage, bulk distribution of meeting cards would be tried. This scheme had shown a worthwhile saving, and members were asked to try to extend this system wherever possible, and to notify the secretary if cards were received individually when they could be delivered through their firms. In closing his report, the secretary, on behalf of members present, proposed a hearty vote of thanks to the retiring section president, Mr. Berry, who, during his term of office, had done much to enhance the reputation of the section.

The election of officers followed and it was decided that Mr. A. M. Whipp should be president and Mr. T. D. Oughton and Mr. B. R. Lock, senior and junior vice-presidents respectively. Mr. H. A. Wincer retains the secretaryship, and three vacancies on the Council were filled by Mr. R. D. Paterson, Mr. F. Baselow, and Mr. R. Bower.

Foundry Problems

The discussion of foundry topics and problems then followed and among the subjects which came up for consideration were: (1) Why do CO_2-sand cores give a rougher finish than oil-sand cores made with the same sand and blacking finish. (2) What were the causes and cure for surface pinholes in castings which are to be vitreous enamelled. (3) What were the " pro's and con's " for temperature control for medium to heavy grey-iron castings. (4) What were the advantages and disadvantages of batch or continuous milling sand for mass-production foundries, and (5) What were the advantages of front slagging.

Another question on the problems involved in carrying out the requirements of the Clean Air Act and good-housekeeping gave rise to much discussion on the various aspects of fume and dust in foundries. In connection with this one member gave a short resumé on the use of wood-flour in moulding sand and the discussion continued on the various properties of sands and results obtained in various foundries by using wood-flour as a binder. Then a sample tee-piece casting, made in 25/20 chrome/nickel steel, which showed surface cracking, was exhibited. This design of casting has to pass a dye-penetrant crack-detection test and much discussion took place on the possible causes of cracking and likely solutions to the problems encountered.

Future Arrangements

Before the meeting closed the secretary announced that next year all meetings are to be held on the third Tuesday of each month, with the exception of those of March and April, which would be on the 10th and 14th respectively. The next session is to commence on Tuesday, October 21, with an afternoon visit to Lake & Elliot, Limited, of Braintree, followed by the presidential evening, also at Braintree. On March 10 the short paper competition for the L. J. Tibbenham award will be held, and the annual social function of the section will be held on Friday, October 24, at the Oriental Cafe, Ipswich. The Four Aces Concert Party has already been engaged for this evening. Finally the secretary thanked Mr. V. W. Child, on behalf of members, for the considerable amount of work he had done in organizing the social functions.

South Africa

Mr. W. A. Burford had a good attendance and an extremely interested audience for his lecture and demonstration on " Simple Analytical Control of Small Foundries," given to the March meeting of the South African branch. Introducing his paper, the author stated that most specifications for copper alloys allowed such wide margins for the various elements that less accurate analytical methods than those usually adopted would be of value to the foundryman, provided that they could be easily carried out without previous laboratory training. He quoted an example with the proportions of 85/5/5/5 and pointed out that in such a specimen the tin content could vary between 4 and 6 per cent. He went on to say that if the foundryman could use analytical methods which were sufficiently accurate to tell him whether he was below the maxima required, or above the minima, or within the limits allowed, he should be able to supply castings to most specifications.

Mr. Burford then gave a demonstration of methods for determining tin, lead, zinc, nickel and phosphorus contents with an accuracy sufficient for most foundry purposes. The principle was based on the use of a centrifuge (as used in chromium-plating plants) to obtain volumes of the various precipitates formed, these then being converted into percentages by multiplying with appropriate factors. He showed a set of equipment which a founder would need for his " own-use " laboratory, and enumerated the quantities of chemicals which would be required.

Mr. S. Webster, who opened the discussion which followed presentation of the paper, recalled that many years ago the analysis of test castings, in particular bronze, would have taken one or even two days, depending on the time which could be allocated to the job. Mr. Burford's demonstration, however, had shown that it was now possible to complete an analysis within half an hour. Mr. Burford replied to numerous questions on the process, and was congratulated by many members on the originality and the pioneering work involved in the preparation of the paper. An extremely interesting and informative lecture was concluded winth a hearty vote of thanks to the author by Mr. H. Thompson.

Birmingham

The March meeting of the Birmingham branch was held at the James Watt Memorial Institute, when Mr. H. Haynes presented a paper entitled " Practical Foundry Techniques," which was illustrated by a series of excellent slides. The author commenced by saying that it was his intention to give details of a few gadgets which had helped him to keep down costs in his foundry, and he continued with a description of the construction and manufacture of a continuous worm-sand mixing machine which fed six roll-over jolt moulding machines. He said that by means of a cast-iron jig it was possible to change 500 patterns per month on the moulding machines without much trouble or interruption of working. He then spoke about a lifting jack which he used to lift the mould off the pattern before putting it in the oven where dry sand

Notes from the Branches

moulding was used, and followed this with a description of a gas-fired oven which he had constructed for the sand moulds. Finally he displayed a three-legged plate which he had devised to hold the spindle used in the construction of loam moulds.

Recruitment of Apprentices

Mr. Haynes followed presentation of his paper with his views on the training of apprentices. He said in his own foundry he usually gave weekly talks to the apprentices, and he felt it was important that apprentices should be taught the elements of pattern- and core-making, also the running of castings and the metal required for various jobs. He thought that the slow recruitment of apprentices was a very serious matter. He then gave an account of some of the jobs done by apprentices in his foundry, and concluded with a description of the method he used for holding down the top part of the mould for casting up to 30-ft. long.

This was the first time Mr. Haynes had visited the Birmingham branch, and members appreciated to the full his address. All present agreed they had had an interesting and enjoyable evening.

London

The annual general meeting of the London Branch was held on April 23 at the Constitutional Club, Northumberland Avenue, London, W.C.2. For the 1958/59 session, Mr. D. E. B. Barnard was elected president, Mr. J. Bain and Mr. D. A. C. Hutchison as senior and junior vice-presidents respectively, and Mr. A. R. Parkes was re-elected honorary secretary. Two new members of Council were elected and these were Mr. H. W. Sims, and Mr. W. Y. Pym; Mr. A. W. Bartlett, Mr. W. R. Buxton and Mr. D. Morris being re-elected out of those who were due to retire.

Following the annual general meeting, there was an ordinary general meeting which took the form of a short-paper competition. Five entries were received and these were kept anonymous until after they had been read by Mr. W. R. Buxton and adjudicated upon by vote at the meeting. All the papers were of excellent quality and the voting was very close. The prize of £5 worth of Savings Bonds was awarded to Mr. L. D. Sparrow who is employed at Fraser & Chalmers Engineering Works of the General Electric Company, Limited. To emphasize the branch's appreciation of the efforts of each of the five entrants, the branch president, Mr. A. Talbot, kindly donated consolation prizes of 50 cigarettes to each of the runners-up. During the evening, a film on "Dust Control at a Foundry Knock-out by means of Side-draught Ventilation" was shown. This film was made by the British Cast Iron Research Association, foundry atmospheres section, and proved a very clear exposition of the advantages to be derived from a logical approach to knockout ventilation.

Australia (Victoria)

The general meeting of the Australia (Victoria) branch was held at the Radio Theatre, Royal Melbourne Technical College. The meeting was held conjointly with the Institution of Production Engineers, and the paper presented was entitled "Shell Moulding Suits Production Engineering," by Mr. G. P. Adams and Mr. R. B. Whitelaw.

News from Africa

Rand Easter Show

The 1958 Rand Easter Show, sponsored and organized by the Witwatersrand Agricultural Society, was held from March 27 to April 7 at Milner Park's Show Grounds, Johannesburg. The attendance this year broke all previous records with a total of 631,845. Of particular interest to foundrymen were displays of the latest types of automatic-moulding and coremaking machines, which were to be seen in operation at various intervals during the day. One of the few foundries to exhibit at the Show was the East Rand Engineering Company, and their principal show-piece was a road-roller, designed and constructed completely in their own foundry and engineering shops.

New Foundry in Port Elizabeth

A new foundry, which will double their output of cast-iron products, has been taken over by Mangolds Engineering, Limited, of Port Elizabeth, from International Combustion (Africa), Limited. It has a capacity of 30 tons of cast-iron products a day. A modern building, with a floor area of 28,000 sq. ft., the new foundry has equipment of the latest type, including cupolas, sand-conditioning and handling plant, moulding machines, a core oven which is automatically fired and controlled, compressors for air services and a crane for services up to 10 tons capacity, including a stock-yard overhead crane for handling raw materials such as pig-iron, coke and scrap.

Take-over Deal

Subject to the approval of shareholders of City Engineering Works, Pretoria, the total issued share capital of Carron (S. Africa), Limited, will be purchased by City Engineering, from the Carron Company of Scotland, for £250,000. In order to implement the deal, the capital of City Engineering is being increased, the word "Carron" incorporated in the company's name and two nominees of Carron, Scotland, elected to the board. The primary object of the scheme is to centralize the manufacturing activities of both companies and, in consequence, reap the benefit of large-scale production. Other benefits are expected to accrue. The opening of a factory in Rhodesia, utilizing surplus plant, is also being considered.

New Rolling Mill

McKechnie Bros. South Africa (Pty.), Limited, Wadeville, Germiston, have recently commissioned their new rolling mill for the production of copper, brass and bronze sheet and strip. Built at a cost of £370,000, the mill is the largest of its type in the Union. The company, a subsidiary of McKechnie Bros., Limited, Birmingham and Widnes, was established in 1948 primarily as extruders of brass, bronze and copper rods and sections. The works, on a 15-acre site, has continually expanded, aluminium extrusions being added to the range in 1952. Fully integrated with its own foundries and refinery, this industrial enterprise is now one of considerable magnitude, being capable of supplying the whole of the Union's demand for a wide range of non-ferrous "semis" previously imported, with capacity also for supplying the needs of the country's northern neighbours.

Iron-ore Deposits Licence

A special exclusive prospecting licence over the iron-ore deposits at Bomvu Ridge, near Mbabane, Swaziland, has been awarded to the Swaziland Iron Ore Development Company. This company has been formed by the Anglo American Corporation and Guest Keen and Nettlefolds, Limited, of London.

Resale Price Maintenance . . . the Present Position

By Lord Meston

The subject of resale price maintenance has had so much publicity recently as a result of judicial inquiries, court cases and Government legislation that it is important to record a factual statement of the present position, especially as many foundry products are directly affected.

The universal desire for a reduction in the price of most commodities has raised many problems. One of these is concerned with the practice of resale price maintenance. The object of this practice is to ensure that, whatever the channels of distribution through which a particular article has passed, it shall be sold to the retail customer at a price which has been fixed in advance by the producer. The term "producer" includes manufacturers—as for example, foundrymen—wholesalers, growers, importers, etc. It is, however, generally the manufacturer of whom one speaks in this connection.

Resale price maintenance is generally associated with "branded" goods, that is, goods which are marked in such a way that their original source may be identified. In the past 50 years the practice of branding goods has grown to a vast extent, and this growth has materially affected the conditions of resale and wholesale trading. Goods are standardized and arrive at the shop ready packed for the customer's immediate use and accompanied by well-designed display cards.

As branding by manufacturers increases, the retailer is no longer the chief interpreter or creator of public taste. This function has been transferred to the manufacturer. Examples of this are to be found in connection with the sale of tea and tobacco, and to a certain extent, proprietary medicines. However, resale price maintenance is also applied to a number of articles which do not come within the category of branded goods.

Is resale price maintenance a good or a bad thing? There are many differing opinions on this question but, broadly speaking, there are two general views of the matter. It is clear that price-cutting of a product by the retailer is likely to mean that other retailers in the district will not stock that product or push those sales, with the result that the manufacturer is denied the breadth of distributive deals and the assurance of co-operation in the promotion of sales that he must have before embarking on the mass-produced products which are, ultimately, very beneficial to the consumer. On the other hand, it is arguable that fixed prices effectively prevent any benefits from improved methods of distribution being handed on to the consumer.

Argument about the desirability or otherwise of the practice of resale price maintenance might have continued indefinitely had not a large section of opinion taken grave exception not to the practice itself but to the methods of enforcing it.

The prices of a substantial proportion of the goods which were sold subject to resale conditions were maintained not by the action of individual manufacturers but by collective action carried out by a group of manufacturers or by an organized trade association which included both manufacturers and distributors.

Collective enforcement took many forms. Sometimes the trade association acted in a comparatively mild manner and merely reduced temporarily the discount or other favourable terms which might have been granted to an offending distributor. On other occasions, the rights of membership of the association might be completely withdrawn for a limited period of time. But the more serious sanction was to cut off supplies by means of a "stop-list" circulated to producers and distributors to indicate those traders who might not be supplied.

Private Courts

The offending trader might be given the option of paying a fine instead of being placed on the "stop-list." And sometimes permanent expulsion of the offender from the association was used as the ultimate sanction, with the consequence that the trader's business was virtually extinguished. Many of the above sanctions were imposed by domestic tribunals, generally known as "private courts" before which the offender was summoned to appear. While these private courts generally acted in a reasonably fair manner the very existence of such unofficial tribunals gave rise to much criticism in the past.

However, that is now past history. The Restrictive Trade Practices Act, 1956, prohibits agreement for *collective* enforcement of conditions as to resale prices. That is to say, it is unlawful for any *two or more persons* carrying on business in the United Kingdom as suppliers of goods to make any agreement or arrangement by which they undertake (*a*) to withhold supplies of goods from dealers who resell goods in breach of any condition as to their price; (*b*) to refuse to supply goods to such dealers except on terms and conditions which are less favourable than those applicable in the case of other dealers; (*c*) to supply goods only to persons who undertake to withhold supplies of goods, or to refuse to supply goods, as aforesaid. And any agreement to recover penalties (however described) from dealers who resell goods in breach of any condition as to their price is unlawful. Likewise the conduct of any domestic proceedings in connection with the recovery of such penalties is unlawful.

Resale Price Maintenance

Hence, all combinations of two or more producers to enforce conditions as to the prices at which their products may be resold must disappear. No criminal proceedings can be taken against any person who contravenes the above provisions which prohibit the collective enforcement of resale price maintenance. But any person may bring civil proceedings in respect of any such contravention and —what is most important of all—compliance with the provisions prohibiting collective enforcement may be enforced by civil proceednge on behalf of the Crown for an injunction or other appropriate relief.

But an *individual* manufacturer is placed in a stronger position than ever. He may enforce the conditions as to the resale price of his products by the ordinary procedure in the Civil Courts. Moreover, he is no longer faced with the difficulty that he can take action only against someone with whom he is in legal contractual relationship. The Restrictive Trade Practices Act, 1956, expressly provides that the supplier (*e.g.* the manufacturer) may take proceedings against any person not party to the original sale who subsequently acquires the goods with notice of the condition as to price as if he had been a party to the original contract of sale. But the manufacturer must be able to "fix" that person with "Notice" as to the condition in regard to the resale price of the particular goods.

Nature of "Notice"

There is no definition of what constitutes such "Notice," but help may be derived from examining some of the methods employed by manufacturers to make their prescribed resale prices known to retailers. Some manufacturers print the retail price on the packet in which the goods are sold to the customer; others supply the retailers with display cards which advertise the product in the shop and at the same time indicate the retail price. Many manufacturers provide retailers with a book or list showing the retail price of their products, or mark the retail price on the invoice—the margin to be taken by the retailer also being shown there. In addition to informing the retailer of his resale prices by one or more of these methods, the manufacturers may simultaneously advertise them to the public.

It is very interesting to note that in the recent case of County Laboratories, Limited *v.* J. Mindel, Limited (1957) (1 All England Reports, p. 806), Mr. Justic Harman, in dealing with these provisions in The Restrictive Trade Practices Act, 1956, said that "Taking with notice" meant taking with express knowledge, and not being put on inquiry. In other words, the "producer" (*e.g.*, the manufacturer), who wishes to enforce conditions as to resale price maintenance, must bring those conditions to the actual "knowledge" of the person against whom he is taking proceedings. It is not enough for the producer to say that everyone knows that his products can be resold only at such and such a price. The producer must go much further than that and prove that he has brought to the distributor knowledge of the fact that the particular conditions exist in the specific case.

Effect of 1956 Act

Foundrymen will find that everything now is in favour of the individual manufacturer who wishes to maintain a condition as to the resale price of his products. Not only may he bring proceedings against a person dealing with his goods where there is no contractual relationship with that person, but the 1956 Act also confers a new power on the Court to grant an injunction restraining the defendant from re-selling in breach of any such condition any goods sold by the manufacturer, whether of the same description as the goods which have caused the trouble, or of any other description.

Parliamentary

Sheffield Able to Cope

Sheffield was better qualified than any other big local authority to cope with noxious industrial emissions claimed Mr. Richard Winterbottom (Lab.) during the recent Commons debate on a prayer by Mr. Nabarro (Con.) to annul a Government order transferring responsibility for discharges from industrial chimneys from local authorities to the Ministry of Housing and Local Government's alkali inspectorate. He appealed to the Minister to allow Sheffield to supervise its own arrangements and said: "Woe betide the Minister if he gives permission to any other city and leaves Sheffield out."

No other city had paid more attention to the problem than Sheffield, said Mr. Winterbottom. It had five fully qualified inspectors and an advanced section at the university was giving the problem special attention. Many of Sheffield's steel firms were introducing innovations which were taking them completely outside the scope of the Clean Air Act.

Law Case

An Unfortunate Accident

Damages of £1,750, including £500 special damages, were awarded at the Yorkshire Spring Assizes, Leeds, by Mr. Justice Elwes, to Mr. William Donald Pannett (44). Defendants in the action were Mr. Pannett's former employers, John Fowler & Company (Leeds), Limited, makers of diesel crawler tractors, diesel locomotives, iron and steel castings, etc. It was stated that Mr. Pannett was steadying a bulldozer track that had been lifted by a crane when the crane suddenly moved to the right, throwing him to the ground and injuring his wrist. A broken bone was later removed from the wrist.

Giving judgment, Mr. Justice Elwes said that Mr. Pannett had been the victim of an unfortunate and unpredictable accident, a misfortune for which nobody was to blame.

THE south-west area office of the Ransome & Marles Bearing Company, Limited, is now at Transom House, Bristol (telephone: 20437/8).

American Letter

FEF College—Industry Conference

Increasing dependence of the foundry industry on effective use of scientific and engineering knowledge was emphasized at the 11th annual college-industry conference of the Foundry Education Foundation in the US. This annual meeting for the exchange of views between foundrymen and faculty members of engineering schools was held at Hotel Statler, Cleveland, March 12-13. FEF president, Chester V. Nass, vice-president, Beardsley & Piper Division, Pettibone Bulliken Corporation, Chicago, presided.

Highlight of the programme was the announcement that the Wheelabrator Foundation had made a grant of about £35,400 to the Foundation, to be devoted largely to graduate fellowships. Although activities had been confined to the undergraduate level of university training, it was pointed out by several speakers that the need for graduate study opportunities to help broaden advanced knowledge had become increasingly apparent. These opportunities would now be provided.

Design of Castings

The central foundry division of the US General Motors Corporation, through a series of conferences, is giving designers and users of castings a better understanding of how cast components can be used most effectively. Speakers at the conferences explain the most economical and effective ways of designing castings and describe the significant new developments in foundry practices. Invitations to conferences held to date have attracted a good response. The series of one-day meetings was inaugurated last December at the Saginaw Malleable Iron Plant, Saginaw, Michigan, and was continued there into this year. Similar conferences are planned to be held at the Defiance, Ohio, and Danville, Illinois, foundries, for customers in the marketing areas of those plants.

Automobile Production

Automobile manufacturers in the US have built 1,586,987 cars so far this year, compared with 2,415,792 in the corresponding period of 1957. The decline reflects efforts to reduce heavy dealer inventories.

AFS Training Courses

Assured attendance at technical meetings has been achieved through the American Foundrymen's Association system of putting on training courses on foundry operations. The AFS Training and Research Institute has had a "sold out" enrolment for its courses. A fee ranging from about £14 upwards per individual is charged for the course. In addition, attendees must pay transportation, hotel and maintenance bills. The procedure does not replace the regular monthly meetings which individual AFS chapters hold in their respective locations over the country.

Training and Research

An intensive three-day course, "Cupola Melting of Iron," held in Berkeley, California, this year, opened the Training and Research Institute's programme of presenting courses in co-operation with chapters of the American Foundrymen's Society. Arrangements for the course, sponsored by the Northern Californian chapter, were started after preliminary work began on a similar course held at Hamilton, Ontario, Canada, March 16-19.

Three teachers conducted the course which included lectures, question and answer periods, and a review of activities. The instructors were Howard H. Wilder, Vanadium Corporation of America, Chicago; Training and Research Institute Director, S. C. Massari; and training supervisor R. E. Betterley.

British and World Shipbuilding

Lloyd's Register Returns for March Quarter

Steamships and motorships under construction in Great Britain and Northern Ireland at the end of March totalled 342 ships of 2,263,854 tons gross, a decrease of 81,554 tons compared with the previous quarter, states Lloyd's Register of shipbuilding returns relating to merchant ships of 100 tons gross and upwards. The vessels included 70 steamships of 1,070,410 tons and 272 motorships of 1,193,444 tons. In other British Commonwealth countries there were under construction 14 steamships of 89,314 tons and 56 motorships of 122,261 tons. Oil tankers building in Great Britain and Northern Ireland totalled 76 ships of 1,069,238 tons, an increase of 20,830 tons compared with the previous quarter and representing 47.2 per cent. of the total tonnage under construction in this country.

Vessels building in the world numbered 1,732 of 10,065,459 tons compared with 1,681 of 9,947,977 tons in the previous quarter. The total included 311 steamers of 4,448,779 tons and 1,421 motorships of 5,616,680 tons. Construction in hand in the principal districts of Great Britain and Northern Ireland is indicated in Table 1.

TABLE 1.—*Shipbuilding Construction in Hand in Principal Districts of Great Britain and Northern Ireland.*

District.	March 31, 1958.		December 31, 1957.		March 31, 1957.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen ..	16	18,882	16	22,879	23	33,731
Barrow ..	2	67,000	3	88,140	3	62,910
Belfast ..	17	298,490	19	303,055	16	199,940
Bristol ..	4	6,430	3	1,080	4	2,451
Clyde—						
Glasgow ..	69	455,263	72	456,296	73	448,054
Greenock ..	31	178,110	28	181,048	32	203,135
Dundee ..	7	48,550	7	47,300	6	38,700
Hartlepool ..	9	71,080	8	65,560	8	59,585
Hull	33	17,153	30	18,446	39	17,814
Leith	13	69,590	13	66,540	12	63,997
Liverpool ..	15	145,487	16	156,168	16	153,593
Middlesbrough	16	206,843	16	198,278	14	174,743
Newcastle-on-Tyne ..	41	421,700	41	446,480	41	399,644
Southampton ..	10	6,921	9	6,650	5	4,010
Sunderland ..	26	217,862	32	259,108	27	206,473

The sizes of steamships and motorships (in parentheses) under construction in Great Britain and Northern Ireland included the following:—100 to 1,000 tons, 5 steam (74 motor); 1,000 to 2,000 tons, 6 steam (31); 2,000 to 4,000 tons, 1 steam (18); 4,000 to 6,000 tons, 1 steam (21); 6,000 to 8,000 tons, 2 steam (26); 8,000 to 10,000 tons, 6 steam (43); 10,000 to 15,000 tons, 17 steam (28); 15,000 to 20,000 tons, 4 steam (1); 20,000 to 25,000 tons, 15 steam (3); 25,000 to 30,000 tons, 7 steam (nil); 30,000 to 40,000 tons, 3 steam (nil); 40,000 tons and above, 2 steam (nil).

Of the steam and motor merchant ships under construction throughout the world at the end of March, 5,518,125 tons (54.8 per cent.) are under the inspection of Lloyd's Register. Of this total, 2,187,538 tons, representing 96.6 per cent. of the tonnage being built there, are under construction in Great Britain and Northern Ireland, while of the tonnage being built abroad, 3,330,587 tons (42.7 per cent.) are to be classed with Lloyd's Register of Shipping.

British Blast Furnaces in the March Quarter, 1958

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the first quarter, 1958.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Clay Cross Co. (Iron & Foundries)	—	—	1	—	1	1	1
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	—	3	—	3	3	4
Kettering Iron & Coal	—	—	1	—	1	1	2
Renishaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	2	—	—	2	1.8	2
Stanton Ironworks: Stanton-by-Dale	—	1	3	—	4	4	5
Staveley Iron & Chemical	—	—	4	—	4	4	4
Stewarts and Lloyds: Corby	—	3	—	—	3	3.4	4
Wellingboro' Iron	—	1	—	—	1	1	3
TOTAL	—	7	15	—	22	22.2	28

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	1	—	—	1	1	1
Darwen & Mostyn Iron	—	—	—	1	1	1	2
Lancashire Steel Manufacturing	—	2	—	1	3	3	3
Summers, John	—	2	—	—	2	2	2
TOTAL	—	5	—	2	7	7	8

North-West Coast.

Barrows Ironworks	2	—	—	—	2	2	4
Charcoal Iron	—	—	1	—	1	1	1
Millom & Askam Hematite Iron	2	—	—	—	2	2	2
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	6	—	1	1	8	8	10

Lincolnshire.

Appleby-Frodingham Steel	—	3	—	—	3	3.7	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	3	—	—	3	3	3
TOTAL	—	9	—	—	9	9.7	10

North-East Coast.

Consett Iron	—	3	—	—	3	3	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	2	—	—	2	2	2
Bessemer	—	1	—	1	2	2	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	3
Normanby Iron Works	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron: West Hartlepool	—	2	—	—	2	2	2
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	4	16	—	1	21	21	28

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	1	—	3	2.9	3
Carron	—	—	1	—	1	1	4
Colvilles: Clyde Works	—	1	—	—	1	1.9	3
Ravenscraig	—	1	—	—	1	1	1
Dixon's Ironworks	—	2	—	—	2	2	6
TOTAL	1	5	2	—	8	8.8	17

South Wales and Monmouthshire.

Briton Ferry Works	1	—	—	—	1	1	1
Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	3
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	3	3
Steel Company of Wales: Margam	—	4	—	—	4	4	4
TOTAL	2	9	—	—	11	11	11

Founders' Company at Lichfield

Lichfield, whose first charter was granted in 1387, was visited during the week of May 5-10, by members of the Worshipful Company of Founders, ancient guild of the City of London, which can claim to have had its first charter over 20 years earlier—in 1365. Each year, members of this livery company select a district in which there are a number of foundries for them to inspect in order that they may keep in touch with the industry which they represent and this year their tour centred on Lichfield. The chief works for them to visit in that city was the foundry of Chamberlin and Hill, Limited, and a visit was made also to Castings, Limited, at Brownhills.

Another good reason for the choice of Lichfield was the fact that this year's Master of the Worshipful Company is a clergyman, the Rev. R. B. R. Walker, Vicar of St. Barnabas, Tufflery, Gloucestershire, whose family has strong London associations and who was especially attracted by the idea of visiting a cathedral city.

Works Visited

Twenty-six members of the Company made the Lichfield tour. Two liverymen of the Company are themselves resident in the town—Dr. J. E. Hurst and Mr. M. M. Hallett, managing director of Chamberlin and Hill, and they were responsible for the arrangements of the visit.

The first place toured was the newly opened works of W. and T. Avery, Limited, at Tame Bridge, Wal-

sall, and on the first evening members were entertained to dinner at the Guildhall, Lichfield, by the directors of Chamberlin and Hill and Bradley and Foster, Limited, of Darlaston. Attending the dinner were the Mayor of Lichfield, Councillor H. J. Hall, the Sheriff, Councillor H. P. Taylor, the Dean, the Very Rev. W. S. Macpherson, the Town Clerk, Mr. H. J. Callender, the Immediate past-Master of the Worshipful Company of Smiths, Councillor A. W. Handford, Ald. C. W. Bridgeman and Mr. J. R. Lindley, representing the Johnson Society. Dr. Hurst proposed a toast to the Worshipful Company of Founders, to which the Master responded. Toasts to the City and County of Lichfield, and to the Dean and Chapter of the Cathedral were responded to by the Sheriff and Dean respectively.

On the second day a visit was paid to Burton-on-Trent where the works of Lloyds (Burton), Limited, were visited as well as those of Bass, Ratcliffe and Gretton. On that evening a cocktail party was held at Wall House, the residence of Mr. C. M. Bather, a director of Chamberlin and Hill, and a dinner of the Livery was held at the George Hotel, Lichfield. On the third day members went to Castings, Limited, and to the foundry of Chamberlin and Hill and they were entertained to lunch by the directors of Castings, Limited. A tour of the Cathedral with the Dean as guide followed and later a visit was made to the works of Bridgeman and Sons.

Joint Study of Future Energy Needs

Joint study of the long-term energy requirements and resources of the European Coal and Steel Community and this country is to be made by the Council of Association between the UK Government and the High Authority of the ECSC. According to the Council's second annual report, preliminary studies are already being undertaken.

The outstanding achievement of the year, the report states, was the steel tariff agreement between the High Authority and the UK Government. Under the agreement this country and the Community are effecting considerable reductions in tariffs on iron and steel products —an important step towards the objective of eliminating trade barriers between the two areas.

The report, which is published as a White Paper (Stationery Office, 1s.), also contains an analysis of the situation in respect of coal, iron, and steel in the UK and the Community in 1957.

British Blast Furnaces in the March Quarter, 1958—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the first quarter, 1958. Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall Iron & Steel	—	—	1	—	1	1	2
Shelton Iron & Steel	—	2	—	—	2	2	3
Stewarts and Lloyds: Bilston	—	1	—	—	1	1.4	3
TOTAL	—	3	2	—	5	5.4	10
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	13	56	20	4	93	95.1	124

Weekly Average Number of Furnaces in Blast during the March Quarter, 1958, and the Previous Four Quarters

District.	1957. March.	June.	Sept.	Dec.	1958. March.
Derby, Leics., Notts., Northants and Essex	26.1	25.3	24.5	22.6	22.2
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6.8	6.6	6	6.6	7
Lincolnshire	10	9.7	9.7	10	9.7
North-East Coast	19.5	21.1	20	20.5	21
Scotland	8.5	9	9.7	9.9	8.8
Staffs., Shrops., Worcs., and Warwicks.	7	7	7	6.2	5.4
South Wales and Monmouth	9.9	11	11	11	11
Sheffield	2	1.1	1	1.9	2
North-West Coast	8.6	8.4	8.8	8.8	8
TOTAL	98.4	99.2	97.7	97.5	95.1

The following companies have furnaces in course of construction or rebuilding:—Lancashire Steel Manufacturing Millom & Askam Hematite Iron; South Durham Steel & Iron (West Hartlepool); Steel Company of Wales; Guest Keen Iron & Steel (Cardiff).

Unemployment Still Rising

A further increase of 11,000 in the numbers of unemployed brought the total at mid-April to 444,000—the highest figure for over five years. The increase was not sufficient, however, to make an appreciable difference to the percentage of unemployed which remains at 2 per cent. of the employed population, the same as the March figure. There was a slight rise of 1,000 in the number of unfilled vacancies (218,000).

During March the numbers in civil employment fell by 23,000 to 23,022,000—the largest reductions being in engineering and textiles. Smaller decreases were reported in coal mining and metal manufacture. In mining and quarrying, employment dropped by 4,000 to 864,000 compared with 869,000 a year ago; in metal manufacture, by 4,000 to 573,000 (582,000); in vehicles, by 1,000 to 1,250,000 (1,209,000) and in engineering, metal goods, and precision instruments, by 15,000 to 2,819,000 (2,817,000). Those working short-time in manufacturing establishments in the week ended March 29 was 119,000, 16,000 more than in the previous month.

The rate of unemployment for the whole country (2.0 per cent.) compared with 3.6 per cent. for Scotland, 3.9 per cent. for Wales, and 10.8 per cent. for Northern Ireland.

REDUCTIONS are announced in the prices of many products of the Expanded Metal Company, Limited, London, S.W.1.

Company News

CRONITE FOUNDRY COMPANY, LIMITED—A one-for-one capitalization issue is to be made to ordinary holders.

COLEY METALS, LIMITED—The company is cutting its payment from 25 per cent. to 20 per cent. for the year to January 31, 1958. This is announced as a dividend, whereas the previous year's total included a 15 per cent. bonus. Group net profit fell to £39,186 from £82,910, after tax of £63,741 (£109,170).

FRY'S (LONDON), LIMITED, tool manufacturers and wholesalers, of London, S.E.1—CIC consent has been obtained for a rights issue of 300,000 ordinary 2s. shares to ordinary shareholders at 2s. 3d. a share in proportion of three new shares for every five held. Turnover in the first eight months of the present year is 2½ per cent. less than for the corresponding period last year, but it is hoped to maintain the 17½ per cent. dividend.

ROBERT HUDSON, LIMITED, manufacturers of light railway equipment, and iron and steel founders, of Leeds—The directors report that providing no major unfavourable influences appear the higher results anticipated in the chairman's statement last year may well be realized. Consequently, an interim dividend of 6¾ per cent. has been recommended (interim 5⅝ per cent., final of 5⅝ per cent., making 11¾ per cent. for the year to June 30, 1957).

GUEST, KEEN & NETTLEFOLDS, LIMITED—The company is raising its dividend by 1½ per cent. to 15 per cent. for 1957. Following the higher interim of 5 per cent., against 3½ per cent., the final is maintained at 10 per cent., the net cost of the total, payable on increased capital, being £2,620,147, against £1,796,071. Maintenance of the previous 13½ per cent. had been foreshadowed. Group profits, before tax, increased by £2,800,000 to £23,455,321. The net profit, after heavier tax, is up from £9.556,539 to £10,199,747.

G. & J. WEIR, LIMITED, engineers and founders, of Glasgow—A continued high level of orders and output was experienced by the company in 1957, although production was insufficient to offset increased costs. There was a decrease in group net profits from £1,401,414 to £981,204, which included two new subsidiaries, and the reduction in earnings was spread over the group as a whole. The dividend is effectively raised by 1 per cent. to 16 per cent. Current assets rose from £11,281.592 to £12,510,580. An extra-ordinary meeting will be held at Glasgow on June 4 to propose converting the parent into a holding company.

Pressed Steel Company to Raise £3,500,000

Without conversion rights a debenture issue is to be made by the Pressed Steel Company, Limited, to raise £3,500,000. Treasury consent has been obtained. In March, 1957, the company made a successful £2,000,000 issue of 5½ per cent. convertible debenture stock and holders of these shares and of the ordinary and preference shares are to be offered the new stock. Mr. A. A. Smith, the chairman, states that the new capital is being raised to finance further expansion of the company's car body works at Cowley and Swindon, motor-car customers having made another upward revision of estimates of the number of car bodies needed from 1959.

The company's prospects are good, says Mr. Smith, but if world deflationary forces gain momentum Britain is unlikely to remain unaffected.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

792,804. Siegfried Junghans, Schorndorf, Wurttemberg, Germany.

A casting machine having means for producing non-stationary magnetic fields to rotate the molten metal and a mould. The shape-giving part of the mould consists of a material, the heat conductivity of which is lower than that of copper, but which, compared with copper, has a higher constant according to the Wiedemann-Franz law.

792,854. Union Carbide Corporation, 30, East 42nd Street, New York, USA.

A method and a resinous product adapted for sealing pores in porous metal articles.

792,951/2/3. United Kingdom Atomic Energy Authority, London.

Production of uranium and plutonium metals by reduction of the oxides.

793,022. Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7.

Exothermic materials used in the lining of walls of feeder heads for castings in metal or sand moulds. Reference should also be made to Patent No. 627,678. The composition is of aluminium, an oxidizing agent, a small proportion of a fluoride and a viscous alkali metal silicate serving as a binder for the other ingredients. At the most there is 5 per cent. weight of water.

793,034. Société D'Electro-Chimie, D'Electro-Métallurgie et des Acieries Electriques D'Ugine, 10 Rue du Général Foy, Paris, 8, France.

Improvements in apparatus for mixing liquid products in a ladle. The apparatus is claimed to be particularly suitable for carrying out metallurgical processes necessitating the mixing of such products.

793,097. General Motors Corporation, Grand Boulevard, Detroit, Michigan.

Protective covers for foundry moulds, stated to be of particular use in the manufacture of cylindrical composite bearings comprising a back or shell to which is bonded a layer of bearing metal.

793,211. United States Pipe and Foundry Company, 3,300 1st Avenue North, Birmingham, Zone 2, Alabama, USA.

The invention refers to a means for applying a coating material to the inner surfaces of a cylindrical metal foundry mould, and to a centrifugal-casting apparatus. (See also Patent No. 594,412.)

Glenfield & Kennedy's Substantial Order-book

Orders in hand stand at well over £9,000,000, states Mr. H. Cowan-Douglas, chairman of Glenfield & Kennedy, Limited, valve manufacturers and hydraulic engineers, of Kilmarnock (Ayrshire), in his annual report. Orders have been few from the oil industry, for tanker valves, and from water authorities, but there has been a large intake of orders for nuclear power stations and little recession in orders for conventional power stations and hydro-electric schemes.

Group sales improved to over £9,000,000 and the net profit is £356,438 (£421,649). The ordinary dividend is maintained at 20 per cent.

News in Brief

F. H. & F. BALL, LIMITED, founders, plan to have extensions built to the works at College Lane, Stratford-on-Avon, Warwickshire.

AS FROM MAY 17, the address of the Wild-Barfield branch office in Canada was changed to: 77, Grenville Street, Toronto, Ontario.

HENRY BROWN & COMPANY, LIMITED, ironfounders, Irvine, Ayrshire, are to demolish a house at Gottries Road and build a canteen and washroom in its place.

SIR STUART GOODWIN, the Sheffield industrialist, and Lady Goodwin, have given £25,000 towards the cost of a new £55,000 gymnasium for Sheffield University.

Mr. AUBREY JONES, Minister of Supply, visited ICI Metals Division, Birmingham, on May 16. Afterwards he went to Phipps (Packaging), Limited, at Aldridge, to see "a typical example of firms hit by defence cuts."

SKLENAR FURNACES, LIMITED, 385, Newport Road, Cardiff, showed a type 50/150 gas-fired furnace melting 52 lb. charges of aluminium in eight minutes at the Hanover Trade Fair. It resulted in the receipt of many enquiries.

FOUNDRY PIG-IRON PRODUCTION in Italy is declining. In 1955, 217,484 *tonnes* were manufactured; in 1956, 208,105 *tonnes* and last year 169,211 *tonnes*. This information is culled from *Assofond*, the official organ of the National Foundry Association.

TWO ELECTRONIC digital computers made by Ferranti, Limited, have gone into service with the aircraft industry. The first, a Pegasus type, is being used at the Brough factory, of Blackburn & General Aircraft, Limited, and the second, a Ferranti Mark 1* has been installed at Armstrong Siddeley Motors, Limited, Ansty (Leics).

IT IS REGRETTED that in a picture caption, used in connection with the annual meeting of the National Society of Master Patternmakers, the vice-president, Mr. W. D. Hartley, was stated to be associated with the firm of Hartley & Sugden, Limited, instead of Fellows & Darby, Limited. Apologies are offered for this error.

Mr. ARNOLD CARR, president of the Refractories Association of Great Britain, started a new plant at the works of J. & J. Dyson, Limited, Stannington, Sheffield, on May 16. The plant will enable the company to increase its output by about 48 per cent.; the previous output was 2,500 tons a month. Afterwards Mr. Carr inspected the plant and factory.

BRITISH RAILWAYS, MIDLAND REGION, have placed an order with Birlec, Limited, of Birmingham, for two electric arc melting furnaces. The new furnaces will be installed in the British Railways' foundry at Crewe, and will produce 21 tons of high-quality steel per day. Each furnace has a nominal capacity of 3½ tons and an electrical rating of 2,000 kva.

NEXT YEAR'S Factory Equipment Exhibition, to be held at Earl's Court, London, will run for 10 days (April 7 to 17), compared with six days this year. Answers to the ill-effects of noise will feature among the exhibits. Attendance at the exhibition this year increased by over 16 per cent., visitors from 61 different countries passing through the turnstiles.

HENRY WILLIAMS, LIMITED, Darlington, manufacturers of permanent-way material and mechanical signalling components and of drop forged junction and lift fishplates, have been appointed sole agents and exclusive licensees for Integra railway signalling systems and all associated equipment in the United Kingdom, Eire, Crown Colonies and Protectorates.

WESTINGHOUSE BRAKE AND SIGNAL COMPANY, LIMITED, London and Chippenham, have been given the contract for the installation of automatic train control between Edinburgh (Waverley) and Glasgow (Queen Street). Fleming Brothers (Structural Engineers), Limited, Glasgow, have been given the contract for the design and erection of a rolling-stock maintenance depot at Hyndland, Glasgow.

Mr. CLIVE COOKSON, chairman of the Consett Iron Company, Limited, opened extensions to the Metallurgy Department at King's College, Newcastle, on May 16. He said there was an urgent need for young men trained in the fundamentals of metallurgy and in the past few years applications received had been three times greater than the number of vacancies in the department—now more would be able to be accepted.

THE MAYOR OF WEST BROMWICH, Alderman F. Leeson, who was once a moulder, opened a new welfare section consisting of shower baths, changing rooms and clothes lockers at the West Bromwich, Black Lake Foundry of Alfred Ellison, Limited, on May 10. Mr. H. Hanks, general manager of the foundry, said the baths were only part of a much larger welfare scheme which included the installation of dust-extraction systems.

PERKINS DIESEL ENGINES are to be manufactured under licence in Spain by Perkins Hispania S.A., at its factory on the outskirts of Madrid. Production is expected to start in the immediate future. The Spanish company has a capital of 80,000,000 pesetas (about £750,000), Samle S.A., Madrid, Perkins distributors in Spain since 1947, will co-operate with Perkins Hispania by organizing the servicing of Spanish-built Perkins engines in its workshops.

THE THORNCLIFFE WORKS of Newton Chambers & Company Limited, were visited on May 15 by a party of engineering deans and heads of departments of Mexican universities and technical colleges. The party is in Europe under a UNESCO fellowship scheme to see universities, technical colleges, factories, research laboratories and special engineering institutions. They are studying the organization and application of training in engineering with a view to strengthening training facilities in Mexico.

THE SHEFFIELD BRANCH of the Chartered Institute of Secretaries celebrated its golden jubilee on Thursday and Friday, May 8 and 9. On Thursday a service was held at Sheffield Cathedral and this was followed by a reception at the Grand Hotel. On Friday, following a visit to the Cutlers' Hall, there was a luncheon at the Royal Victoria Hotel, where Dr. L. du Garde Peach and Sir Ashley Ward paid tribute to the service of Mr. Ernest Robinson as chairman. A banquet and ball was held on Friday evening.

UNITED STEEL COMPANIES, LIMITED, announce that Patchett Steel Constructions (Ptv.), Limited, of Cape Town, has changed its name to Unisteel Structural (Pty.), Limited, and is now a wholly-owned subsidiary. United Steel has had an interest in this company since 1953. Unisteel Structural fabricates and erects steelwork for building and civil engineering purposes and is also engaged in the fabrication of water pipes. One of its current contracts is the supply and erection of structural steelwork for the new Athlone power station in Cape Town.

LONG-SERVICE AWARDS in recognition of over 1,000 years total service were presented to 37 employees of the BTR group of companies at a ceremony held at

News in Brief

St. Ermin's Hotel, London, S.W.1, on May 13. The awards were presented by the chairman of BTR Industries, Limited, Sir Graham Hayman. Amongst those honoured were four employees each with 50 years service—other awards being for 40, 30, and 20 years, respectively. The recipients included Mr. C. H. Kichenside, a director of the BTR Company's subsidiary, A. G. Spalding & Bros., Limited.

THE MIDLAND REGIONAL ADVISORY COUNCIL of the Economic League has held its inaugural meeting in Birmingham with Mr. Alan Sherlaw presiding, and Mr. F. H. Griffiths as honorary treasurer. Twelve senior executives from Midland industry compose the council which will advise on trends and conditions, help to devise new methods and improve existing work. In his report the Regional Director, Mr. J. O'Malley, said that activities in the first quarter of this year were 52 per cent. up on the same period last year. In the current year it was planned to distribute over 2,500,000 leaflets.

ON JULY 12, a memorial to the firm of Charles Burrell & Sons, Limited, will be unveiled at Thetford by Mr. John Howlett, a former apprentice of the firm and now a director of Wellworthy Piston Rings, Limited. The memorial is in the form of a bronze plaque, 24 by 22 in., cast by the Morris Singer Company, of Kennington, affixed to a wall of the old works in Minstergate, Thetford, where the firm carried on their business from 1770 to 1930. The plaque shows in high relief the world's first heavy-duty steam road-haulage engine with its own track in the act of leaving the works in 1856.

IN CONFIRMING THE REPORT that Alvis, Limited, of Coventry is to return to quantity production of cars Mr. J. J. Parkes, chairman and managing director, said that arrangements are well advanced, including plans for the coach-building firm of Park Ward & Company to concentrate most of its facilities on Alvis work. It has also been stated that Alvis's return to activity in the car industry will be marked by the introduction of two new models, a sports saloon and a convertible which will be shown at this year's Motor Show. The power unit will be basically the three-litre engine now in use by Alvis.

THE CORRECT PLACING OF THE FEET for manual handling and lifting in industry was demonstrated by Mr. G. Hickling, of the Central Council for Physical Education, to delegates at the Royal Society for the Prevention of Accidents Conference at Scarborough this month. Mr. Hickling said that correct methods of handling or lifting would prevent many accidents and reduce the possibility of injury. Most back injuries were due to failure to keep the back straight and take the strain with the legs by bending the knees. The feet should always be at hip width to give a firm base and prevent undue strain on the back.

A NEW TYPE of continuous, electric enamelling furnace of 750 kw. capacity has been installed at the Belling & Company, Limited, works at Enfield, and has been in operation since January. It was designed and built by Ferro Enamels, Limited, of Wolverhampton. It stalled on the centre line of the furnace in the burning chamber is a centre wall to carry part of the elements; this feature provides for wide distribution of the elements and thereby ensures even temperature conditions throughout the chamber. Improved heating distribution has been achieved by spreading the loading elements over the furnace walls and floor, to predetermined and calculated figures.

DEPLORING THE FLUCTUATIONS in the price of non-ferrous metals, Mr. Francis B. Willmott, speaking at the May meeting of the Non-Ferrous Club at the Queen's Hotel, Birmingham, drew attention to the difficulties under which industry laboured because of the variations in the price of its raw materials. Surely, he said, it was not beyond the ingenuity of the metal trade to devise a system which would ensure stability. He gave a warning that there was a danger of other materials of more settled value being used by manufacturers wherever they could be substituted for non-ferrous metals, and he thought the metal trade should take note of this tendency. At the meeting the sum of £16 10s. 0d. was raised by the Club on behalf of the Royal Metal Trades Pension and Benevolent Society.

Mr. ARTHUR MARSHALL, managing director of Thomas Marshall & Company (Loxley), Limited, refractories, Storrs Bridge Works, Loxley, near Sheffield, handed over the first of the certificates outlining the terms and conditions of the firm's new Employees Benefit Scheme on Friday, May 16. The firm has made profit sharing, which was previously given at the discretion of the directors, a legal annual right of each employee. The bonus is calculated by reference to the annual profits of the Marshall group in 1957. Distribution is made from 10 per cent of the profits and is equivalent to about two weeks' basic pay. The scheme also includes a sick club for which a benefit of over £4 is payable for a weekly payment of 1s. 9d. and a non-contributory pension scheme ensures £1 a week for life.

THE NATIONAL UNION OF MANUFACTURERS held a special forum at the Birmingham Chamber of Commerce on May 7 to launch a new export drive by the smaller Midland firms. Exploration of world markets by small and medium-sized companies is the aim of the campaign and an exports committee has been formed to assist them in overcoming the problems of entering overseas markets. Mr. Basil Boothby, export adviser to the NUM, urged manufacturers to make fuller use of general export merchants. Others who gave advice or expressed opinions on ways and means of developing export trading were Mr. J. W. Bache, export sales director of the Austin Motor Company, Limited, and Mr. W. W. Kirk, managing director of Lawden Manufacturing Company, Birmingham, who advocated sales units, or combinations of firms financing their own sales organizations overseas. Following consideration by the Midland NUM exports committee of the various ideas forwarded at the meeting an exports advisory service is to be established.

THE COVENTRY IRON FOUNDRY of Sterling Metals, Limited, closes down this week, and 300 employees are to be dismissed. The firm is transferring work to the mechanized plant at Nuneaton. An official said the works there will be able to maintain the same rate of production with a smaller labour force. In a statement issued by the firm it is emphasized that the dismissal of the workers is not due to a contraction of the company's activities, but "is due to the shut-down of the iron foundry and its ancillaries at the Northey Road Works. The employees have been aware of the position since 1955 when they were notified of the company's intention to build the new iron foundry at Nuneaton." The 300 men to be dismissed are surplus to requirements, and the question of compensation for loss of employment is being considered. The remaining 160 employees will be transferred to new jobs at the Nuneaton works after Whitsun. The firm also intends to move out of its other Coventry factory at Durbar Avenue, but this may not take place for two or three years.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

MARKET BOSWORTH, June 7—Providing and laying about 1,400 yd. of 3-in. dia. spun-iron water mains, including valves, hydrants and fittings. Documents from Pick, Everard, Keay and Gimson, 6, Millstone Lane, Leicester, on payment of a deposit of £2 2s. 0d.

WOKINGHAM, June 2—Construction of approx. 190 yd. 4-in. dia. spun-iron rising main. Documents from the Council's Chief Engineer on payment of a deposit of £2 2s. 0d.

AMESBURY, May 30—Regional water supply, contract No. 10. Construction of approimately four miles of 6-in. dia., 4-in. dia., and 3-in. dia. spun-iron water mains, together with service connections and associated works, near Shrewton, Wilts. Documents from Lemon and Blizard, Lansdowne House, Castle Lane, Southampton. Deposit £3 3s.

WEYBRIDGE, May 31—Construction of foul water sewers, comprising approximately 1,560 lin. yd. of 9-in. dia. cast-iron pipes laid at depths varying from 3 and 12 ft. Documents from the Engineer and Surveyor, Council Offices, Walton-on-Thames, Surrey.

SOUTH AFRICA, June 5—2,000 cases, coin box, gravity-die-cast aluminium alloy. (ESB 11740/58.)

PROJECTILE & ENGINEERING COMPANY, LIMITED—Mr. V. A. G. Lambert has been appointed deputy chairman. He joined the board at the annual meeting last May.

HUGHES BOLCKOW SHIPBREAKING COMPANY, LIMITED—Mr. R. E. Norman, secretary of the company since 1953, has been given the additional appointment of assistant general manager. The company is one of the two shipbreaking units in the Metal Industries group.

Recent Wills

KIRKUP, R. H., managing director of the Darlington Engineering Company (Gateshead), Limited ... £21,938

FRANKLIN, W. W., technical director of the Davy & United Engineering Company, Limited, Sheffield £5,637

POTTS, WILLIAM, a former joint secretary of Swan, Hunter, & Wigham Richardson, Limited, shipbuilders, etc., of Wallsend (Northumberland) ... £4,037

SHANKS, J. K., chairman of Cruikshank & Company, Limited, Denny Ironworks, Denny (Stirlingshire), and associated with the company for more than 60 years £70,021

WAVERLEY, VISCOUNT (formerly Sir John Anderson), Chancellor of the Exchequer, 1943-45, a director of a number of companies, including Imperial Chemical Industries, Limited, and formerly a director of Vickers, Limited, first president of the British Hydro-mechanics Research Association and president of the Coal Trade Benevolent Association, 1953-54 ... ... £15,453

Forthcoming Events

MAY 28

Institute of British Foundrymen

Birmingham branch:—"Influence of Manganese-sulphide Segregation on Vitreous Enamelling of Grey Cast Iron," by C. C. Hanson and A. D. Morgan, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

MAY 29

Southampton Metallurgical Society

Annual general meeting and social evening, 7.15 p.m., at the Southampton University.

MAY 30

Incorporated Plant Engineers

Birmingham branch:—"Ideas and Problems"—discussion by a panel of specialist members of their own and other members' ideas and problems, 7.30 p.m., at the Imperial Hotel, Temple Street.

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Personal

Mr. JOHN J. HOOPER and Mr. D. HORN have been appointed directors of Industrial Newspapers, Limited, a subsidiary of Argus Press, Limited.

Sir ERNEST GOODALE has been elected president of the British Colour Council for the coming year, and Mr. HENRY G. DOWLING has been elected chairman.

Mr. BERNARD BOXALL, deputy managing director of Production-Engineering, Limited, has been appointed to the board of Scottish Aviation, Limited, Prestwick, as deputy chairman.

Mr. E. E. PHEASEY, M.B.E., has been appointed works director of Thompson Bros (Bilston), Limited, Bradley Engineering Works, Staffs. He was previously with Foster, Yates & Thom, Limited, general engineers of Blackburn, Lancs.

Mr. R. V. DOWLE, general works superintendent, and Mr. J. H. NEWMAN, chief of die design of Birmingham Aluminium Casting (1903) Company, Limited, a member of the Birmid group, are on a visit to the USA to carry out investigations on heavy die-casting and general foundry problems.

A presentation has been made to Mr. D. A. MALTHA, sales representative in Holland for 30 years for Head, Wrightson & Company, Limited, engineers and iron-founders, of Thornaby-on-Tees. Mr. Maltha, who retired last December, had the longest service of the firm's sales representatives.

Mr. THOMAS BERKLEY, secretary of the Tyne Dock Engineering Company, Limited, South Shields, for 15 years, has retired owing to prolonged ill-health. He joined the firm 45 years ago as an office boy. His successor is Mr. J. M. HEPPLE, who joined the company in 1937. Mr. Hepple has been assistant secretary since November.

Mr. D. COATES, who has been in charge of the annealing section of the Shaw Foundry Company, Willenhall, Staffs, for a number of years, has retired at the age of 65. He received presentations on behalf of the management, his colleagues and the works benevolent fund from directors, Mr. Alan Crook and Mr. Leslie Witheridge.

At the National Industrial Safety conference organized from May 9 to 11 by the Royal Society for the Prevention of Accidents, it was announced that the Society's director-general, Major-General B. K. YOUNG, is to retire next March. He will be succeeded by Brig. R. F. E. STONEY, who has been deputy director-general for several years.

Mr. WILLOUGHBY LAPPIN, who was a personal assistant to Lord Hives, chairman of Rolls-Royce, Limited, until his retirement, and latterly to Mr. J. D. Pearson, chief executive and deputy-chairman of the company, has now retired. Mr. Lappin, had been associated with Rolls-Royce Limited, since 1917. He was made a C.B.E. (Civil Division) in the 1952 New Year Honours.

Mr. THOMAS JOHNSTON, chairman of the North of Scotland Hydro-Electric Board has been appointed president of the British Electrical Development Association in succession to VISCOUNT CHANDOS, and Lt.-Col. E. H. E. WOODWARD, who was a member of the British Electricity Authority and the Central Electricity Authority until last December, has been appointed vice-president. Mr. W. N. C. CLINCH, controller, Eastern Division, Central Electricity Generating Board, has been elected chairman of the EDA Council, for the year 1958-59, and Mr. T. E. DANIEL, chairman, North Western Electricity Board, as vice-chairman.

Metro-Vick Plant in 1957

Iron and steel works equipment was among the large export orders received by the Metropolitan-Vickers Electrical Company, Limited, including that at Durgapur, West Bengal, for a group of British manufacturers grouped together as Iscon (Indian Steelworks Construction Company, Limited). The four electrical companies in Iscon are each specializing on their own standard equipment for use throughout the steelworks rather than one company making all the plant in one area. Metro-Vick will be supplying the motors, and orders for 150 machines so far have been received.

At home important orders from Samuel Fox & Company, Stocksbridge, were completed. These comprise two 4,000-h.p. d.c. motors supplied from two 1,600-kw. motor-generator sets for the main drives of two hot reversing mills; and a 1,500-h.p. a.c. motor, 15 d.c. motors (200-h.p. to 350-h.p.), mercury-arc rectifier units, and special control gear for an 18-stand rod and bar mill.

In July, a twin drive for a large blooming mill for Dorman Long (Steel), Limited, was commissioned at their Cleveland Works, including two 2,500-h.p. 40/90-r.p.m. motors with associated flywheel motor-generator set and control equipment.

Four 850-h.p. 6.6-kv. FLP squirrel-cage motors were supplied through Harland Engineering for driving main dewatering pumps for the new Cynheidre Colliery, South Wales. The NCB has also ordered some 90-h.p. FLP motors for driving the six-stage compressors of "Armstrong Airbreakers."

Seven 90-h.p., 14-ton FLP battery locomotives ordered by the National Coal Board are now in use at Maltby Colliery. Two similar locomotives were built for Rothes Colliery during the year, and an order for six more was received for Bilston Glen Colliery, Scotland.

Obituary

The death has occurred of Mr. JOHN HUGH CARLISLE, joint managing director of William Elliss & Sons, Limited, ironfounders, of Lock Street, Sheffield, and managing director of the Eagle Foundry, Sheffield.

The death is announced of Mr. C. D. COOPER, proprietor of the Dolphin Foundry (F. S. Cooper), Chapel Street, Ancoats, Manchester 1. He had been with this old-established family business for almost 50 years.

Mr. ARNOLD RIMMER, formerly head of the mechanical engineering department of the Derby and District College of Technology, has died at the age of 68. He was a former president of the Derby Society of Engineers.

The death is announced of Mr. CHRISTOPHER JOHN WARD, managing director of the scrap-metal firm of C. T. Ward and Sons, Limited, of Cato Street, Birmingham. He was 43. Mr. Ward suceeded his father, who founded the firm, as managing director in 1940.

The death has occurred of Mr. WILLIAM JOHN GOUGH, founder and a director of Coseley Brass Foundry, Limited, Bilston, Staffs. He was 76. Mr. Gough was a member of Coseley Urban Council for 12 years until 1946, and a former member of Bilston Rotary Club.

Mr. WILLIAM JOHN PICKERSGILL has died in Sunderland at the age of 87. He was chairman of Wm. Pickersgill & Sons, Limited, ship builders and repairers, of Southwick-on-Wear, Sunderland, from 1935 to 1954, and had served as foreman in three outside departments of the company before being appointed managing director in 1907.

Advantages of Iron Castings

At the annual general meeting of the National and Midland Ironfounders' Association held at the Queen's Hotel, Birmingham, on May 21, Dr. J. G. Pearce, director of the British Cast Iron Research Association, spoke on the "Advantages of Iron Castings," and a report of his address is given below.

The modern iron casting can be made in a wide range of sizes and designs to suit engineering requirements, and in a variety of structures to meet varying conditions with respect to resistance to stress, heat, corrosion and wear. The annual output in the United Kingdom approaches 4,000,000 tons and in this respect, six counties comprising the Midland Area is by far the most important, producing as it does some two-fifths of this total. What is still more important, an appreciable fraction of this output covers castings of grey and malleable cast irons for automobiles, commercial vehicles, tractors, machine-tools, engines and power units of all kinds, of relatively high value for the weight involved and demanding the highest degree of technical control and skill. Nevertheless, weight output is not a good criterion, and value, which embodies skill, know-how, technical knowledge and control, is preferable. The UK output had doubled since 1945 and after the present recession a further expansion is envisaged during the next five years.

Fundamental Products

The production of iron castings is fundamental to an industrial community for castings form a considerable proportion of engineering export products of special importance to the Midlands. The industry is ever striving towards increased efficiency and economy and now has a complete organization as a national industry, with representative associations both trade and technical, together with national institutions, for both technological and craft training.

The peculiar advantage of the iron casting to the engineer lies in his ability to obtain comparatively cheaply, and in one piece, virtually any design in a wide variety of shapes, sizes and section thicknesses. Furthermore, not only is the product made from the necessary raw materials under one roof, without involving a long sequence of operations involving capital, materials and storage, at every stage, but in the main it is produced from native raw materials.

Clean Air Act Conference

The British Cast Iron Research Association is collaborating with the Council of Ironfoundry Associations in holding a short conference on the Clean Air Act at Ashorne Hill, near Leamington Spa, from Monday afternoon, July 7, to Tuesday afternoon, July 8. The programme is not yet established in its final form, but it is expected that it will cover the legal requirements of the Act, and a survey of the problems involved; papers and discussions on specific subjects, such as the (cold-blast) cupola furnace, and the types of arresters and suppressors available. It is hoped to give time to the discussion of some special aspects, *e.g.*, influence of environment, height of furnace stack, space considerations, dirty scrap, availability of water, etc. Sessions will also, if possible, be arranged to deal with smoke and fume including methods of estimating and detecting smoke, and with other foundry furnaces including the "scheduled" furnaces, *e.g.*, the hot-blast cupola, rotary, air, and the coal-fired malleable annealing furnaces.

Details are available on writing to the British Cast Iron Research Association at Alvechurch, Birmingham.

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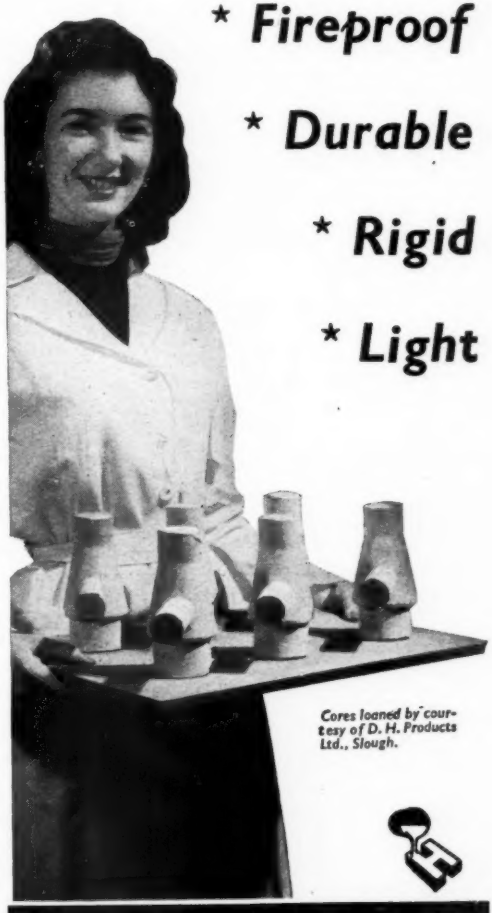

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Pig-iron and Steel Production

Statistical Summary of March Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in March. Table 3, weekly average production of finished steel in February. Table 4 gives the production of pig-iron and ferro-alloys in March, and furnaces in blast. (All figures are weekly averages in thousands of tons.)

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100.			Iron-ore output.	Imptd. ore used.	Coke to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	I. & S.	Coal.	Basic materials excl. fuel[1]						Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[3]
1955	276	399	529	311	244	246	240	213	29	381	305	1,247
1956	295	454	542	312	272	264	253	216	27	397	318	1,444
1957—Nov. ..	344	511	508	317	319	273	282	229	16	429	359	1,492
Dec. ..	344	511	500	276	313	265	276	206	13	398	314	1,444
1958—Jan.[4] ..	344	510	493	299	303	260	271	214	15	407	321	1,406
Feb. ..	343	510	488	295	313	260	273	226	13	427	332	1,365
Mar. ..	343	513	488	285	305	258	268	233	13	432	—	1,405

TABLE 2.—*Weekly Average Production of Steel Ingots and Castings in March*, 1958

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derby, Leics., Notts., Northants and Essex .	—	4.9	8.5 (basic)	2.7	0.1	14.7	1.5	16.2
Lancs. (excl. N.W. Coast), Denbigh, Flints., and Ches.	2 2	38.7	—	2.7	0.4	42.5	1.5	44.0
Yorks: (excl. N.E. Coast and Sheffield)								
Lincs.	—	46 3	—	—	0.1	46.2	0.2	46.4
North-East Coast	0 8	86.9	—	1.4	0.5	87.6	2.0	89.6
Scotland	2.6	45.4	—	2.8	0.2	48.6	2.4	51.0
Staffs., Salop, Worcs., and Warwicks.	—	22.0	—	1.1	0.9	22.1	1.9	24.0
S. Wales and Monmouthshire	1.9	83.6	7.5 (basic)	1.1	0.2	92.7	0.6	93.3
Sheffield (incl. small quantity in Sheffield) ..	10.3	36.6	—	13.2	0.4	58.4	2.1	60.5
North-West Coast	0.1	1.2	5.3 (acid)	0.6	0.1	7.1	0.2	7.3
Total	17.9	364.6	21.3	25.6	2.9	419.9	12.4	432.3
February, 1958	16.9	359.6	21.8	26.4	2.8	415.1	12.4	427.5
March, 1957	20 2	357.3	27.0	23.9	2 6	419.6	11.4	431.0

TABLE 3.—*Production of New Non-alloy and Alloy Finished Steel.*

Product.	1956.	1957.	1957.	1958.	
			Feb.	Jan.[4]	Feb.
Non-alloy steel:					
Ingots, blooms, billets and slabs[5]	4.7	5.0	5.2	5.7	4.6
Heavy rails ..	9.7	11.2	12.6	10.4	10.9
Sleepers, etc. ..	1.8	2.1	2.8	1.9	1.5
Plates, 3 mm. and over	50.2	54.3	57.4	51 7	55.3
Other heavy prod.	50.3	53.0	54.7	53.8	57.4
Ferro-conc. bars ..	7.8	8.8	7.9	8.5	9.2
Wire rods ..	22.9	23.3	24.5	25.3	23.2
Arches, etc. ..	10.1	11.0	11.8	10.9	10.7
Other light sections	41.4	38.8	45.0	37.2	36.1
Bright steel bars ..	8.0	7 0	7.8	7 0	7 2
Hot-rolled strip ..	24.5	23.1	26.2	23.7	27.2
Cold-rolled strip ..	7.5	7.1	7.0	7.9	8.4
Sheets, incl. coated:					
(i) Hot rolled ..	15.0	13.0	14 1	12.7	12.6
(ii) Cold reduced	24.8	29.1	28.9	32.4	31.2
Tin and terneplate	15.9	18 8	20 2	15.1	17.4
Blackplate.. ..	1.3	1 0	1 0	1.1	0.8
Steel tubes and pipes	26 2	22 1	25.4	18 7	21.6
Tube, pipe fittings	0.5	0 5	0.5	0.4	0.4
Tyres, wheels, axles	4.6	5.1	5.1	5.4	5.4
Forgings (excl. drop forgings) ..	3.0	3 1	3 4	2.8	3.1
Steel castings ..	4.5	4.6	5 2	4.7	4.8
Tool and magnet steel	0 3	0 3	0.5	0.3	0.3
Total	335.0	342.3	367.2	337.6	350.3
Alloy steel	17.3	17.8	18.6	17.8	20.1
Total deliveries from U.K. prod.[6] ..	352.3	360.1	385.8	355.4	370.4
Add: Imported finished steel ..	19.5	9.6	10.3	12.1	11.2
	371.8	369.7	396.1	367.5	381.6
Deduct: Intra-industry conversion[7] ..	55.2	48.1	55.3	48.1	51.0
Total new material ..	316.6	321.6	340.8	319.4	330.6

TABLE 4.—*Production of Pig-iron and Ferro-alloys during March*, 1958

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby, Leics., Notts., Northants and Essex	22	2.4	18.6	20.7	1.0	—	42.7
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Ches. ..	7	—	21.1	—	—	1.6	22.7
Yorks. (excl. N.E. Coast and Sheffield)							
Lincs.	9	—	37.3	—	—	—	37.3
North-East Coast	21	4.5	59.8	—	—	1.3	65.6
Scotland	8	0.9	17.4	1.8	—	—	20.1
Staffs., Salop., Worcs., and Warwicks. ..	5	—	8.0	1.7	—	—	9.7
S. Wales and Monmouthshire	11	4.7	42.8	—	—	—	47.5
Sheffield	2	—	3.7	—	—	—	3.7
North-West Coast	8	17.0	—	0.2	—	1.1	18.3
Total ..	93	29.5	208.7	24.4	1.0	4.0	267.6
February, 1958 ..	94	25.7	214.8	27.2	0.4	4.6	272.7
March, 1957 ..	97	31.4	218.8	25.4	0.3	1.3	277.2

[1] Used in non-food manufacturing industries.
[2] Weekly average of calendar month.
[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.
[4] Five weeks all tables.
[5] Other than for conversion into any other form of finished steel listed.
[6] Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.
[7] Material for conversion into other products also listed in this table.

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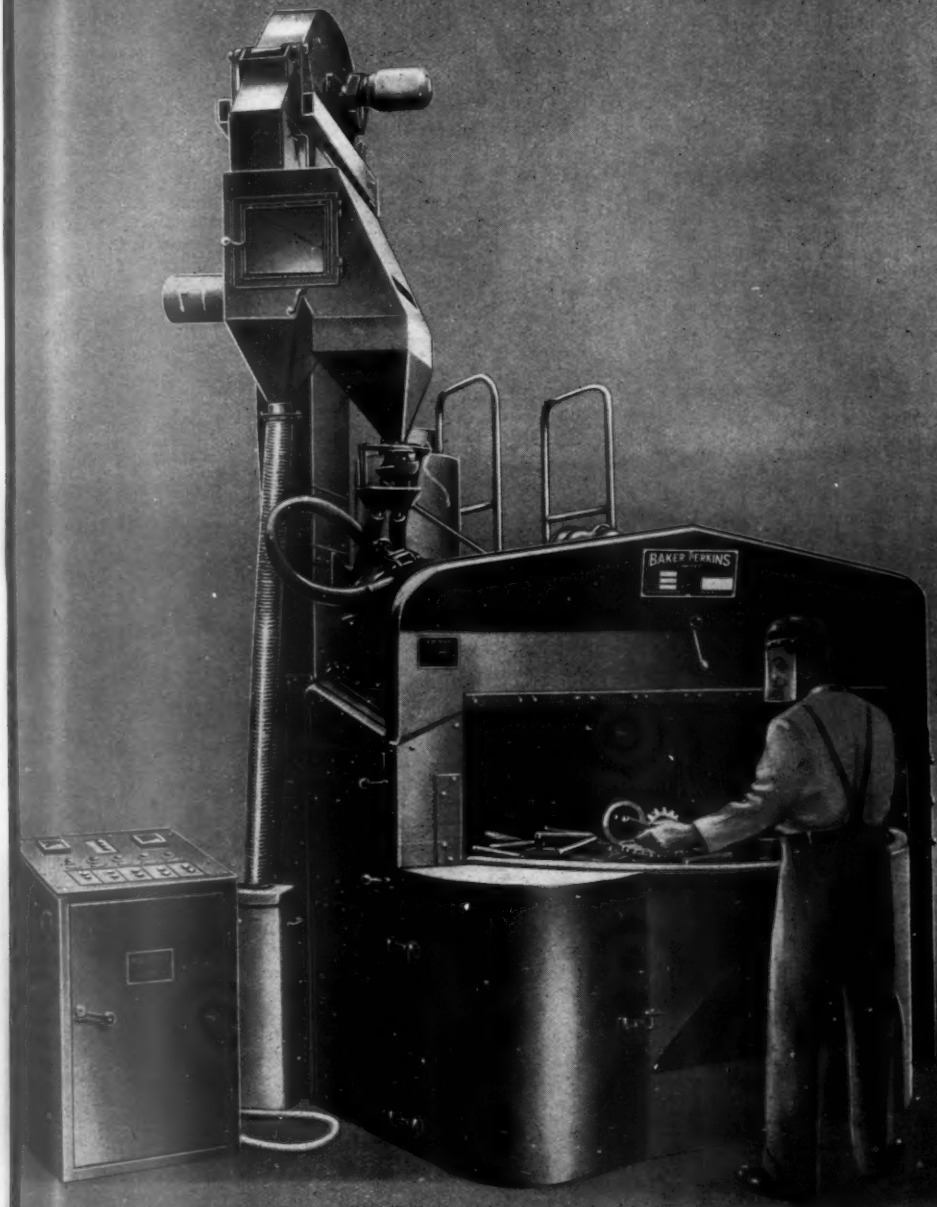

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Raw Material Markets

Iron and Steel

Plentiful supplies of all grades of pig-iron are available for the requirements of consumers, and present outputs—although not at capacity levels—are more than sufficient to satisfy demands. Production, which is being maintained at a good level, could be stepped up to meet an expansion in demand in all grades should this position arise. Major production is still concentrated on the supply of basic pig-iron for the steelworks, which are able to absorb the tonnages which arise for their consumption and stock requirements. Home producers are able to fully satisfy their needs and imported supplies are no longer necessary, although some small consignments continue to come forward against old contracts.

The trend of business in the ironfounding industry continues to restrict the demand for pig-iron, and producers are finding it increasingly difficult to dispose of all their makes. The biggest demand continues for the low-phosphorus irons, but, with increased production and varying demands, available supplies now appear to be excessive.

The motor-car industry continues to take up appreciable tonnages, but recently there have been fewer demands for castings for commercial vehicles and consequently a proportionate reduction in the tonnage of pig-iron required. The machine-tool industry is also not calling for the same quantity of castings, and some foundries are adversely affected. Some sections of the heavy engineering trades are also not so heavily employed.

The overall requirements of high-duty castings, however, absorb the greater tonnage of the foundry irons as, in addition to the low-phosphorus grades, the foundries are also using a fair amount of hematite and some refined irons.

The light-castings trade is very quiet, and the textile and jobbing foundries are also short of work. The call for high-phosphorus pig-iron is moderate and, although outputs are reduced, makers are unable to dispose fully of their outputs. Consequently stocks at the furnaces are daily growing larger. Only the minimum of stock is being carried by the foundries. Most grades of pig-iron are available for overseas buyers, but orders are scarce and competition very keen. Ample supplies of scrap are available, and the foundries are receiving adequate tonnages of foundry coke, ganister, limestone, and firebricks.

Home steelworks are able to satisfy promptly the current demands for steel semis, and could appreciably increase outputs. The re-rollers, however, are specifying moderately and as yet there is no improvement in their position.

The call for bars and sections is moderate, and most of the mills, particularly in the Midlands, are engaged on a short working week, which, from the business now being obtained, is likely to continue for some time, there being very little forward buying. In most cases consumers can obtain their needs promptly and it is not necessary to keep material in stock in view of the present uncertain trading position.

Non-ferrous Metals

The continuation of the strike at Chuquicamata and the recent successive declines in copper stocks in the UK are the two important market factors at the present time. Yet the undertone is firmish, reflecting satisfactory buying both here and on the Continent. Even more relevant is the fact that consumption in Europe remains good. Indeed, the price has been steady around £180 a ton for some time now and a consolidation of the present position over the summer months may well put the market in a sound position to move when—and if—demand expands in the September quarter.

News from America, however, remains disappointing. Imports are running at a high level and fabricators have dropped some of their prices. Nevertheless, custom smelters seem to be able to acquire all the scrap they desire at the present price of 23¼ cents a pound and the producers are holding their quotation at 25 cents a pound.

As far as the Chuquicamata dispute is concerned, a report from Santiago on Tuesday stated that acceptance by the strikers of some arbitration proposals had been officially announced.

Tin continues weak and the UK price is back on the "floor." On the other hand, stocks are declining despite the fact that the buffer stock manager has not had to support the market, so that the present position may well be better than it looks. Demand is largely routine, but the general belief is that an improvement on the present price levels is not far away. In the US the market is slow, with the price around 94½ cents a pound.

Lead is coming under pressure in America owing to the continued high rate of imports allied to the fact that it is now most unlikely that early action can be taken with regard to tariffs because of the Administration's concern for its new proposals about price supports. In February, US stocks increased by as much as 21 per cent., and at the beginning of March stood at 107,200 short tons. Domestic mine production declined by about 8 per cent., but consumption for February, at 69,700 short tons, was the lowest since 1950.

Zinc, for the same reasons as lead, is coming under pressure as imports continue to flow into the country. These imports are underselling the domestic metal by up to 1 cent a pound and any persistence of this trend must render the present price level of both zinc and lead vulnerable. Currently, the price of lead is 12 cents a pound and that of zinc 10 cents a pound.

Nickel Production and Deliveries

Nickel deliveries in all forms for the first quarter of the year were about 50,000,000 lb., compared with over 75,000,000 lb. in the fourth quarter of last year, states an interim report issued by Dr. John F. Thompson and Mr. Henry S. Wingate, chairman and president, respectively, of the International Nickel Company of Canada, Limited. The continuing lower level of demand and the size of the company's stocks of unsold nickel have forced Inco to make two successive curtailments of nickel production in Canada, reducing from this month the annual rate of production to about 250,000,000 lb.

Net earnings for the first quarter were $12,213,000 ($0.83 per common share) compared with $23,504,000 ($1.61) a year ago and $20,124,000 ($1.38) for the fourth quarter of 1957. Capital expenditure dropped from $12,999,000 in the last quarter of 1957 to $10,946,000, but was above the figure for the first quarter of last year—$10,028,000.

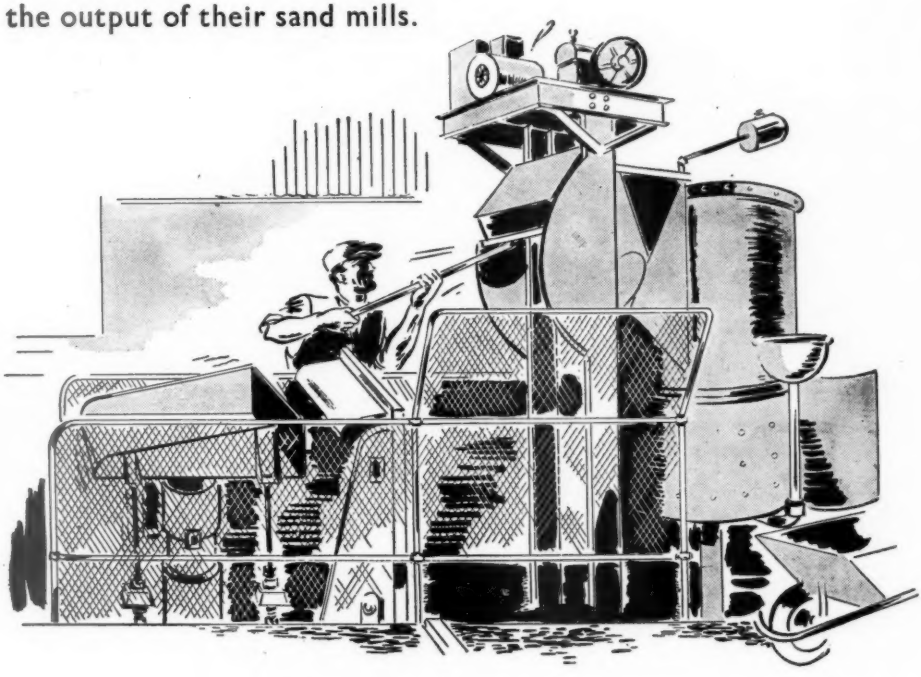
ADDITIONAL OFFICE SPACE in the new Bucklersbury House in the City of London has been acquired by John Miles & Partners (London), Limited, to house the expanding consulting engineering and design staff. The present premises in Cannon Street, London, E.C.4, will still be retained. The new offices on the sixth floor of the central Walbrook wing of the 13-storey building have been occupied since May 17.

'FULBOND'

TRADE MARK

for quick bond development

'FULBOND' develops its bond so rapidly that foundrymen can reduce milling time and increase the output of their sand mills.



For service and information write to:

THE FULLERS' EARTH UNION LTD.

Patteson Court, Nutfield Road, Redhill, Surrey

Telephone: REDHILL 3521

CMF 13

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

May 21, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £47 10s. 0d. to £48 0s. 0d., scale 17s. 0d. per unit; 75 per cent. Si, £67 0s. 0d. to £67 10s. 0d., scale 17s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 7s. 8d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 10s. 8d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £91 10s. 0d., basis 60 per cent. Cr, scale 30s. 0d. to 30s. 6d., per unit; over 6 per cent. C, £87 10s. 0d., basis 60 per cent. Cr, scale 30s. 6d. per unit; 2 per cent. C,* 2s. 1d. to 1½d. per lb. Cr; 1 per cent. C,* 2s. 1½d. per lb. Cr; 0.15 per cent. C,* 2s. 2½d. per lb. Cr; 0.10 per cent. C,* 2s. 2¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 2½d. to 7s. 9½d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £265 0s. 0d.; 96/98 per cent., £295 0s. 0d.

Ferro-columbium.—65/72 per cent., Nb + Ta, 19s. 9d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £83 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s., 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

* Average 68-70 per cent.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats, 5 in. wide and under, untested soft basic, 50 tons and over: £40 0s. 6d; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £66 16s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £177 10s. 0d. to £177 15s. 0d.; three months, £179 10s. 0d. to £180 0s. 0d.; settlement, £177 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 8⅞d. per lb.; rods, 202s. 6d. per cwt. basis; 20 s.w.g., 235s. 9d. per cwt.

Tin.—Cash, £730 0s. 0d. to £730 10s. 0d.; three months, £733 10s. 0d. to £734 0s. 0d.; settlement, £730 10s. 0d.

Lead (Refined Pig).—Second half May, £71 17s. 6d. to £72 0s. 0d.; second half August, £72 5s. 0d. to £72 7s. 6d.

Zinc.—Second half May, £61 7s. 6d. to £61 10s. 0d.; second half August, £61 15s. 0d. to £61 17s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £95 7s. 6d.; rolled zinc (boiler plates), all English destinations, £93 2s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £85 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 5⅜d. per lb.; sheets to 10 w.g., 155s. 6d. per cwt.; wire, 2s. 2⅞d.; rolled metal, 155s. 6d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £129; B6 (85/15), £170 ; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £162; HTB2 (38 tons), — ; HTB3 (48 tons), —.

Gunmetal.—BS1400, LG2 (85/5/5/5), £153; LG3 (86/7/5/2), £163; G1 (88/10/2/⅛), £222; (88/10/2/1), £210.

Phosphor Bronze.—BS1400, PB1 (AID released), £240 per ton.

Phosphor Bronze Strip, etc.—Strip, 231s. 0d. per cwt.; wire, 3s. 6¼d. per lb.; rods, 2s. 9⅝d.; tubes, 2s. 9⅝d.; chill cast bars: solids 2s. 10½d.; cored 2s. 11½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 5d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 9⅝d.; special quality turning rod, 10 per cent., ⅛ in. dia., in straight lengths, 3s. 8⅛d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £76 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £195; AB2, £215.